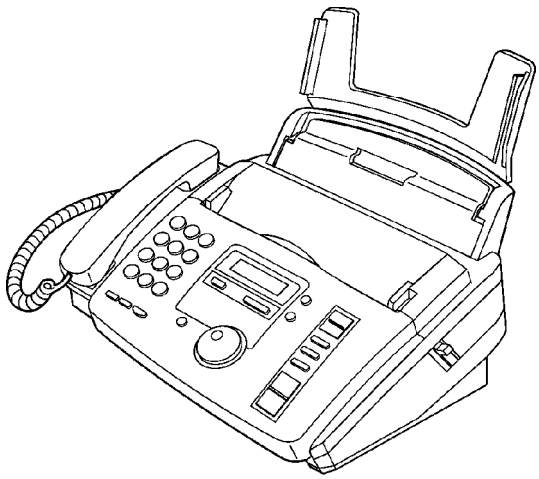
ORDER NO. KMF0006414C1

Service Manual

Compact Plain Paper FAX

KX-FP80C

(for Canada)



©

Panasonic

When you note the serial number,write down all 11 digitals. The serial number may be found on the bottom of the unit.

1. INTRODUCTION

1.1. SAFETY PRECAUTIONS

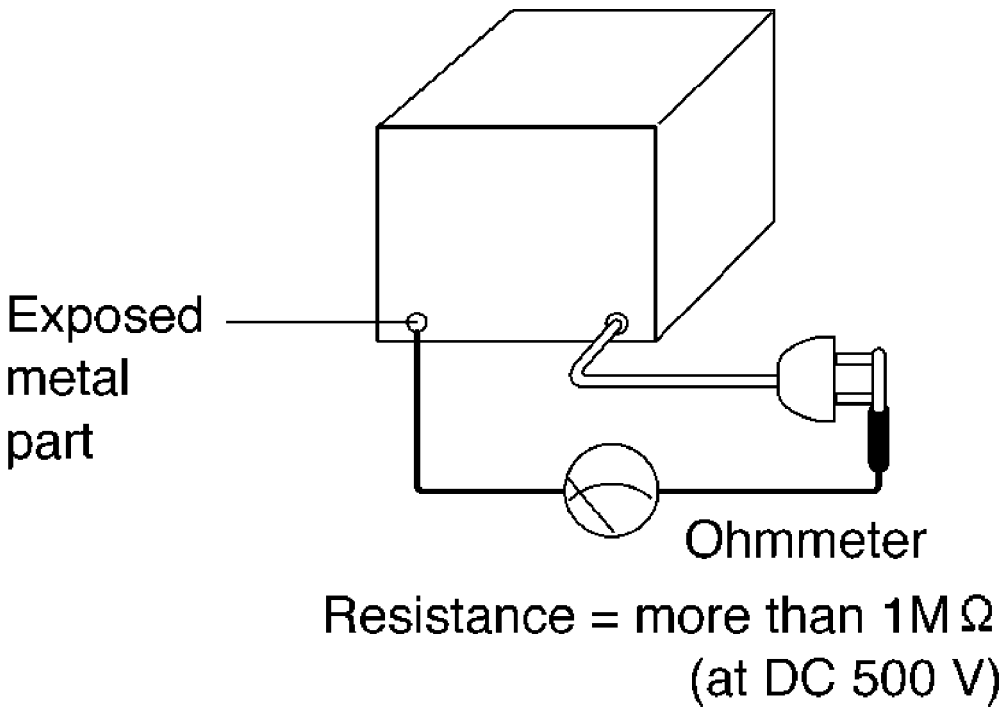
1. Before servicing, unplug the AC power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended

components.

3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

1.2. INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screw heads, control shafts, bottom frame, etc.).
   Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.



1.3. FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.
When repairing, the following precautions will help prevent recurring malfunctions.

1. Cover the plastic part's boxes with aluminum foil.
2. Ground the soldering irons.
3. Use a conductive mat on the worktable.
4. Do not touch the IC or LSI pins with bare fingers.

1.4. BATTERY CAUTION

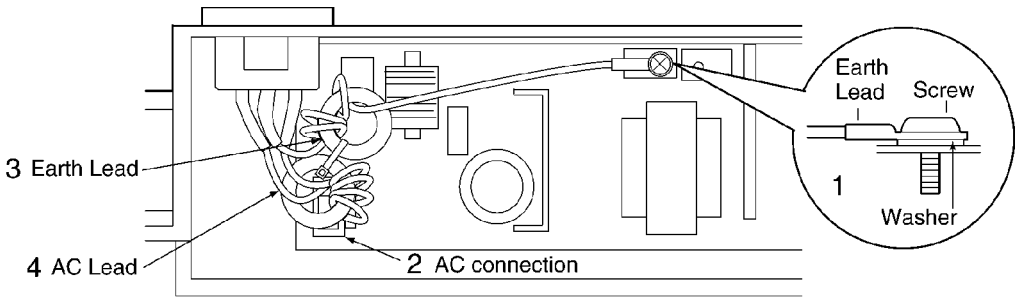
CAUTION

Danger of explosion if the battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to following caution:
Disposal of lithium batteries should be performed by permitted, professional disposal firms knowledgeable in state government federal and local hazardous materials and hazardous waste transportation and disposal requirements.
A battery continues to have no transportation limitations as long as it is separated to prevent short circuits and packed in strong packaging.
Commercial firms that dispose of any quantity of lithium cells should have a mechanism in place to account for their ultimate disposition. This is a good practice for all types of commercial or industrial waste.
Recommend Type Number:
CR2032 (BAT501) Manufactured by MATSUSHITA
CR2032 (BAT501) Manufactured by SONY

1.5. AC CAUTION

For safety, before closing the lower cabinet, please make sure of the following precautions.

1. The earth lead is fixed with the screw.
2. The AC connector is connected properly.
3. Wrap the earth lead around the core 3 times.
4. Wrap the AC lead around the core 2 times.



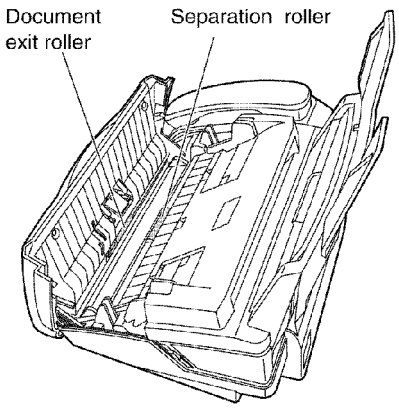
(Bottom View)

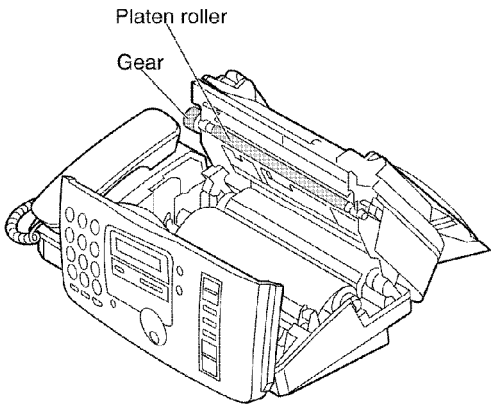
1.6. PERSONAL SAFETY PRECAUTIONS

1.6.1. MOVING SECTIONS OF THE UNIT

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit.

The moving sections of the unit are the rollers and a gear. There is a separation roller and a document feed roller which are rotated by the document feed motor. A gear rotates the two rollers. Be careful not to touch them with your hands, especially when the unit is operating.



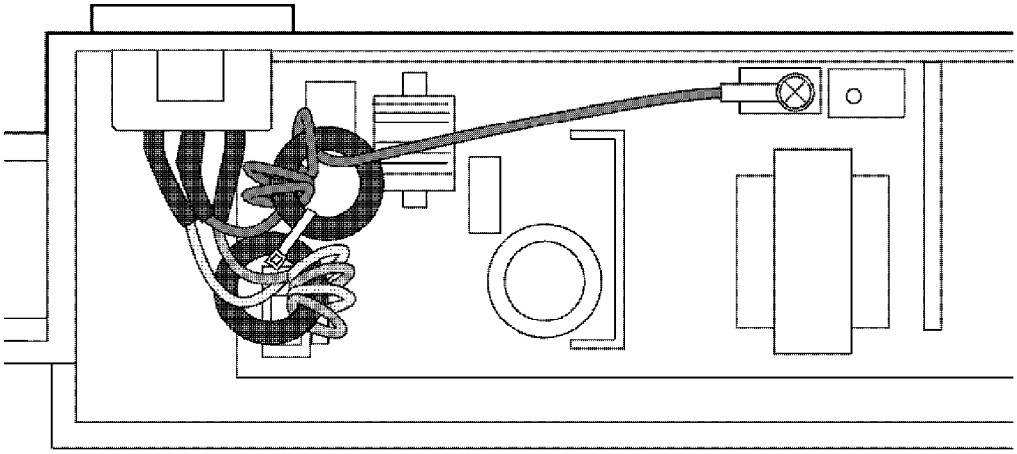


1.6.2. LIVE ELECTRICAL SECTIONS

All the electrical sections of the unit supplied with AC power by the AC power cord are live. Never disassemble the unit for service with the AC power supply plugged in.

CAUTION:

AC voltage is supplied to the primary side of the power supply unit. Therefore, always unplug the AC power cord before disassembling for service.

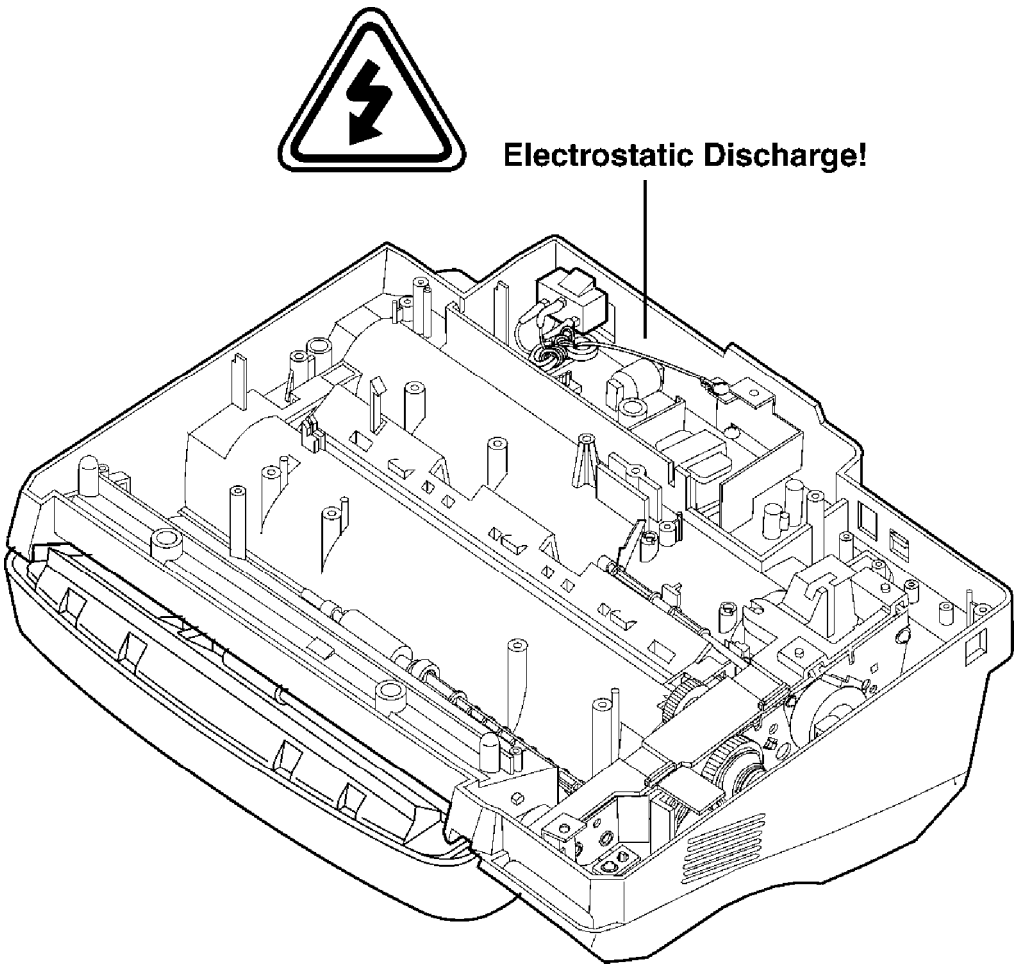


(Bottom View)

1.7. SERVICE PRECAUTIONS

1.7.1. PRECAUTIONS TO PREVENT DAMAGE FROM STATIC ELECTRICITY

Electrical charges accumulate on a person. For instance, clothes rubbing together can damage electric elements or change their electrical characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity. Never touch the electrical sections such as the power supply unit, etc.



1.8. FEATURES

General

- Help function

Please refer to 2.1.3. WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE HELP FUNCTION.() to print below features.

Display:

1. QUICK SET UP
2. FEATURE LIST
3. SPEED DIALING
4. FAX SND/RCV
5. COPIER
6. Q and A
7. ERRORS
8. REPORTS

- LCD (Liquid Crystal Display) readout
- TAM (Telephone answering machine) interface

Plain Paper Facsimile Machine

- 15 second transmission speed *
- Letter/G3 compatible
- Automatic document feeder (10 sheets)
- Fax pager call
- Quick scan
- Resolution: Standard/Fine/Super fine/Half tone (64 level)
- Broad cast with SPEED DIRECTOR
- 50-sheet paper capacity (20 lb.)
- Automatic fax/phone switching
- Distinctive ring detection **

*** The 15 second speed is based upon the ITU-T No. 1 Test Chart on the condition that memory transmission is performed.**
**** Subscription to distinctive ring services is required.**

Large Memory (24 pages)... Performed by DRAM
Approx. 24 pages of memory reception
Approx. 21 pages of memory transmission

Integrated Telephone System

- On-hook dialing
- Monitor speaker
- Voice muting

- Redialing function
- 40-Station telephone directory with Speed Director

Enhanced Copier Function

- Multi-copy function (up to 40 copies)
- Enlargement and reduction
- Collate
- 64-Level halftone

1.9. SPECIFICATIONS

Applicable Lines:

Public Switched Telephone Network

Document Size:

Max. 216 mm (8 1/2") in width
Max. 600 mm (23 5/8") in length

Effective Scanning Width:

208 mm (8 3/16")

Recording Paper Size:

Letter: 216×279 mm (8 1/2"×11")
Legal: 216×356 mm (8 1/2"×14")

Effective Printing Width:

208 mm (8 3/16")

Transmission Time*:

Approx. 15 s/page (Original mode)**

Scanning Density:

Horizontal:
8 pels/mm (203 pels/inch)
Vertical:
3.85 lines/mm (98 lines/inch)—STANDARD mode
7.7 lines/mm (196 lines/inch)—FINE/HALF TONE mode
15.4 lines/mm (392 lines/inch)—SUPER FINE Mode

Halftone Level:

64-level

Scanner Type:

Contact Image Sensor (CIS)

Printer Type:

Thermal Transfer on Plain Paper

Data Compression System:

Modified Huffman (MH), Modified READ (MR)

Modem Speed:

9,600/7,200/4,800/2,400 bps; Automatic Fallback

Operating Environment:

5—35°C (41—95°F), 20—80 % RH (Relative Humidity)

Dimensions (H×W×D):

185×345×276 mm (7 9/32"×13 19/32"×10 7/8")

Mass (Weight):

Approx. 3.2 kg (8.5 lb.)

Power Consumption:

Standby: Approx. 3.3 W
Transmission: Approx. 16 W
Reception: Approx. 42 W (When receiving a 20% black document)
Copy: Approx. 42 W (When copying a 20% black document)
Maximum: Approx. 135 W (When copying a 100% black document)

Power Supply:

120 V AC, 60 Hz

Memory Capacity:

Approx. 24 pages memory reception
Approx. 21 pages memory transmission
(Based on ITU-T No. 1 Test Chart in standard resolution.)

*** Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of the other party's machine.**
**** The 15 second speed is based upon the ITU-T No. 1 Test Chart and original mode. (Refer to "1.11. ITU-T No. 1 Test Chart".) If the capability of the other party's machine is inferior to your unit, the transmission time may be longer.**

Note:

- Any details given in these instructions are subject to change without notice.
- The pictures and illustrations in these instructions may vary slightly from the actual product.

Design and specifications are subject to change without notice.

1.10. OPTIONAL ACCESSORIES

Model No.	Description	Specifications
KX-FA55A	Replacement Film	2 rolls-216 mm X 50 m (8½" X 164')

1.11. TEST CHART

1.11.1. ITU-T No.1 TEST CHART

THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC 18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

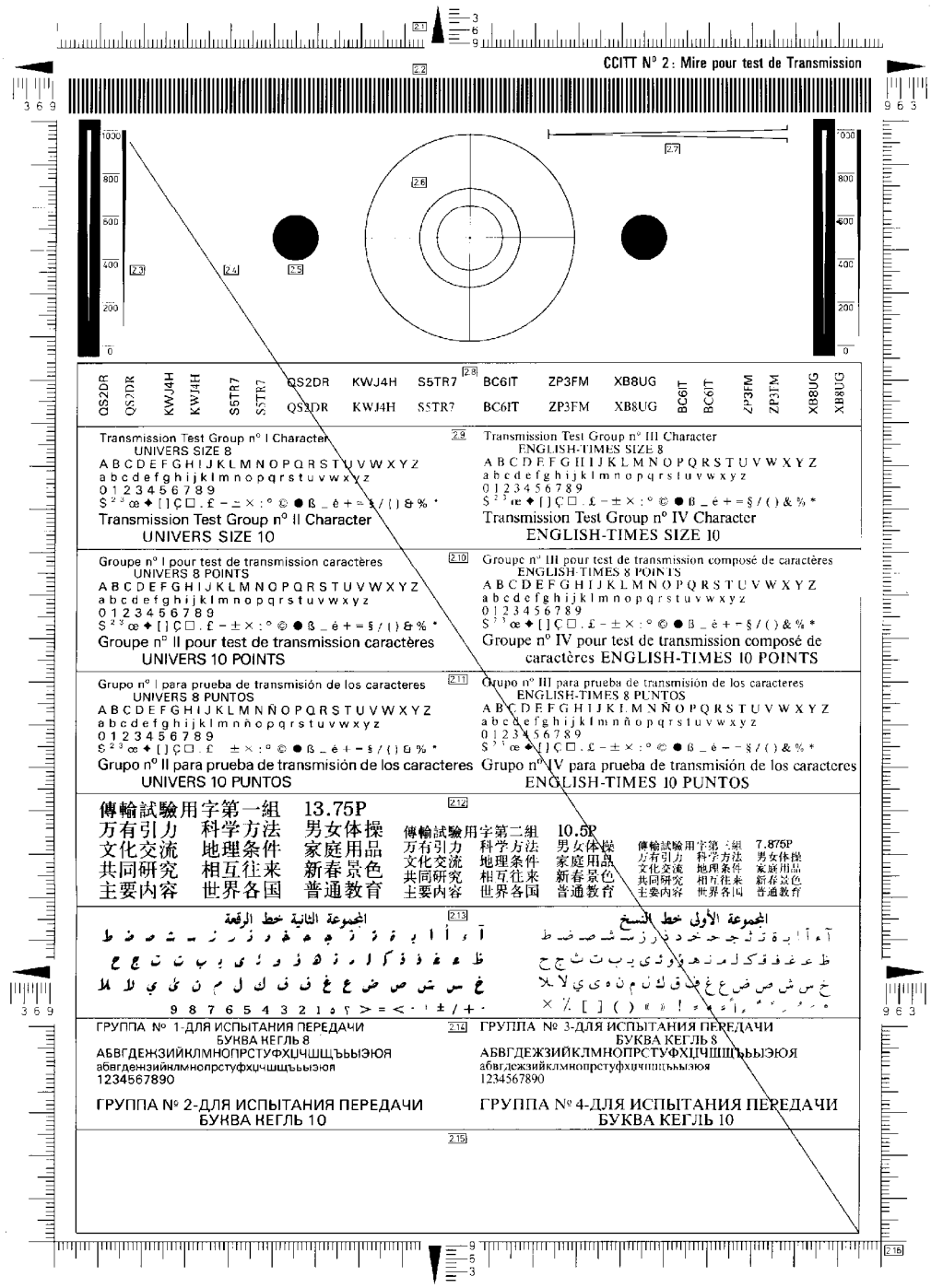
Yours sincerely,

Phil.

P.J. CROSS
Group Leader - Facsimile Research

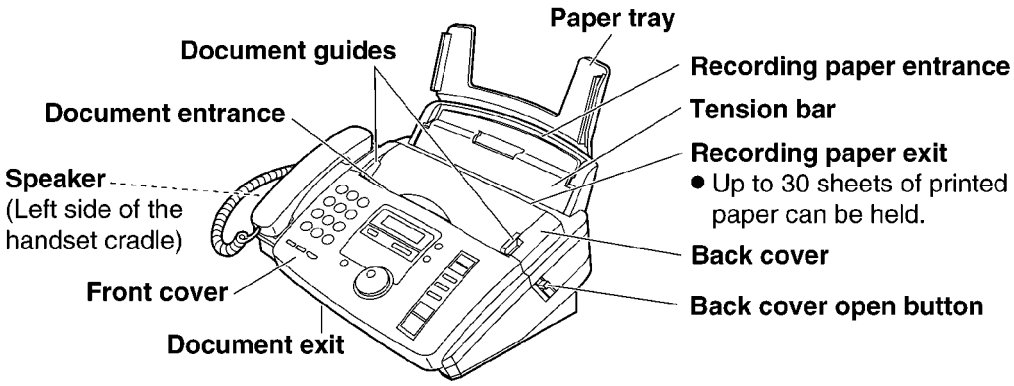
Registered in England: No. 2038
Registered Office: 60 Vicara Lane, Ilford. Essex.

1.11.2. ITU-T No.2 TEST CHART


CCITT N° 2 : Mire pour test de Transmission
QS2DR KWJ4H S5TR7 BC6IT ZP3FM XB8UG
Transmission Test Group n° I Character
UNIVERS SIZE 8
Transmission Test Group n° II Character
UNIVERS SIZE 10
Transmission Test Group n° III Character
ENGLISH-TIMES SIZE 8
Transmission Test Group n° IV Character
ENGLISH-TIMES SIZE 10
Groupe n° I pour test de transmission caractères
UNIVERS 8 POINTS
Groupe n° II pour test de transmission caractères
UNIVERS 10 POINTS
Groupe n° III pour test de transmission composé de caractères
ENGLISH-TIMES 8 POINTS
Groupe n° IV pour test de transmission composé de caractères ENGLISH-TIMES 10 POINTS
Grupo n° I para prueba de transmisión de los caracteres
UNIVERS 8 PUNTOS
Grupo n° II para prueba de transmisión de los caracteres
UNIVERS 10 PUNTOS
Grupo n° III para prueba de transmisión de los caracteres
ENGLISH-TIMES 8 PUNTOS
Grupo n° IV para prueba de transmisión de los caracteres
ENGLISH-TIMES 10 PUNTOS
傳輸試驗用字第一組 13.75P
万有引力 科学方法 男女体操
文化交流 地理条件 家庭用品
共同研究 相互往来 新春景色
主要内容 世界各国 普通教育
傳輸試驗用字第二組 10.5P
傳輸試驗用字第三組 7.875P
ГРУППА № 1-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 8
ГРУППА № 2-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 10
ГРУППА № 3-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 8
ГРУППА № 4-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 10

1.12. LOCATION OF CONTROLS

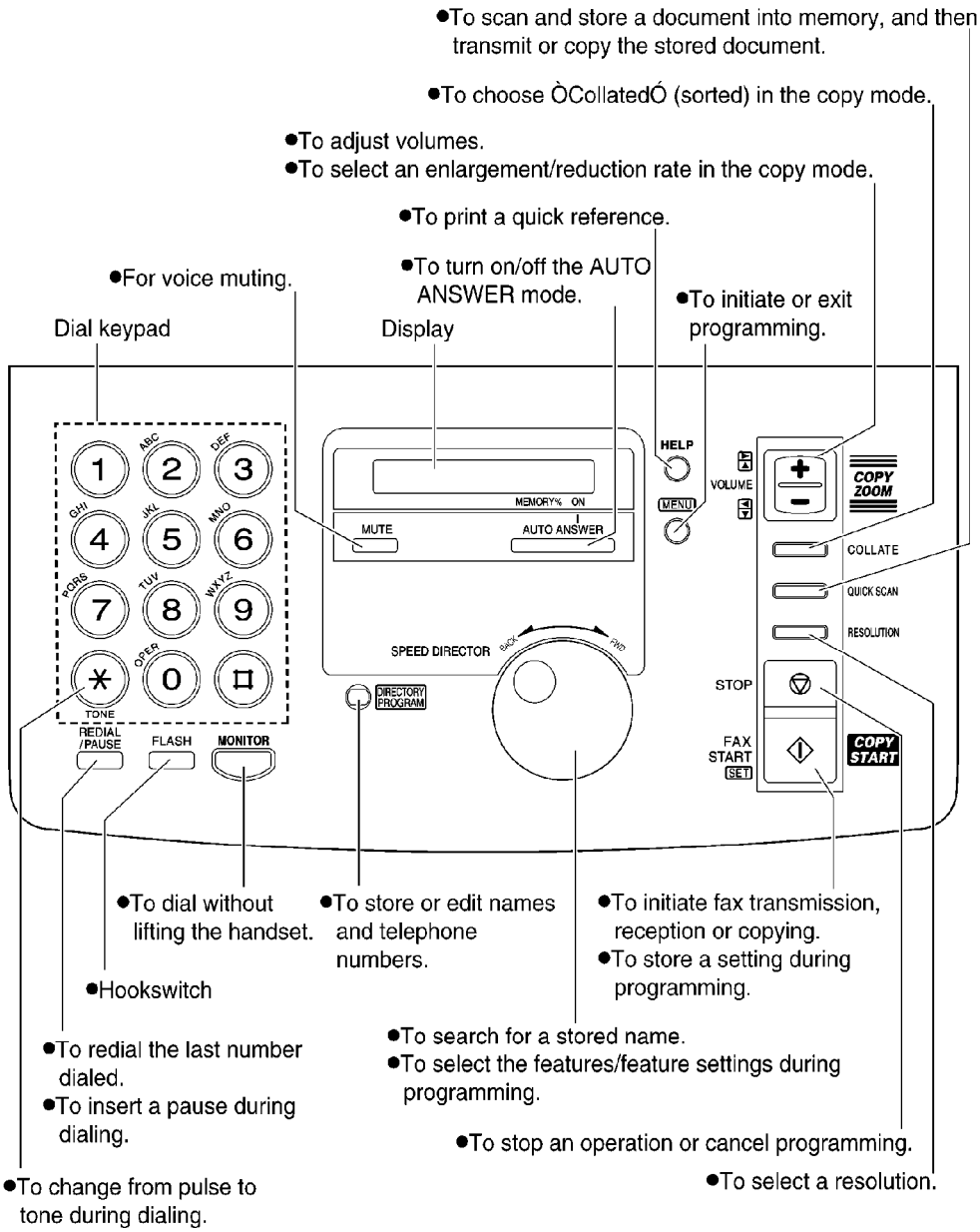
1.12.1. OVERVIEW



Note:

- The document will be ejected from the front of the unit. Install the unit on a desk or floor with a smooth surface and do not place anything in front of the unit.

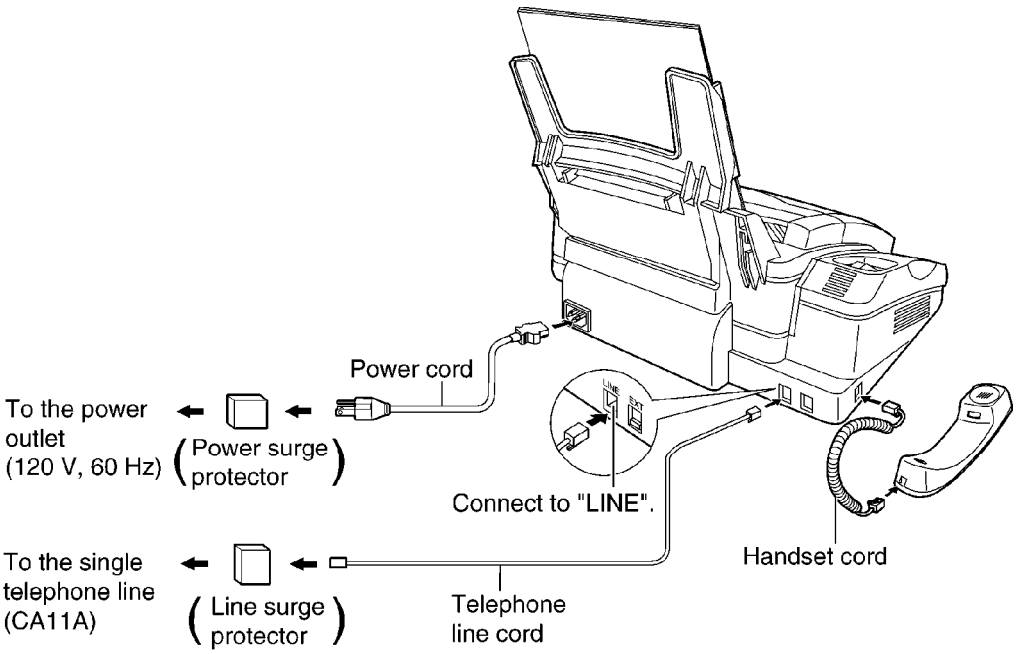
1.12.2. CONTROL PANEL



1.13. CONNECTIONS

(1) Connect the handset cord.
(2) Connect the telephone line cord.
(3) Connect the power cord.

- When the power is turned on for the first time, the unit will print some basic information.



Note:

- For additional equipment protection, we recommend the use of a surge protector. The following types are available; TELESPIKE BLOK MODEL TSB (TRIPPE MFG. CO.), SPIKE BLOK MODEL SK6-0 (TRIPPE MFG. CO.), SUPER MAX (PANAMAX) or MP1 (ITW LINX). / The warranty does not cover damage due to power line surges or lightning.

- When you operate this product, the power outlet should be near the product and easily accessible.

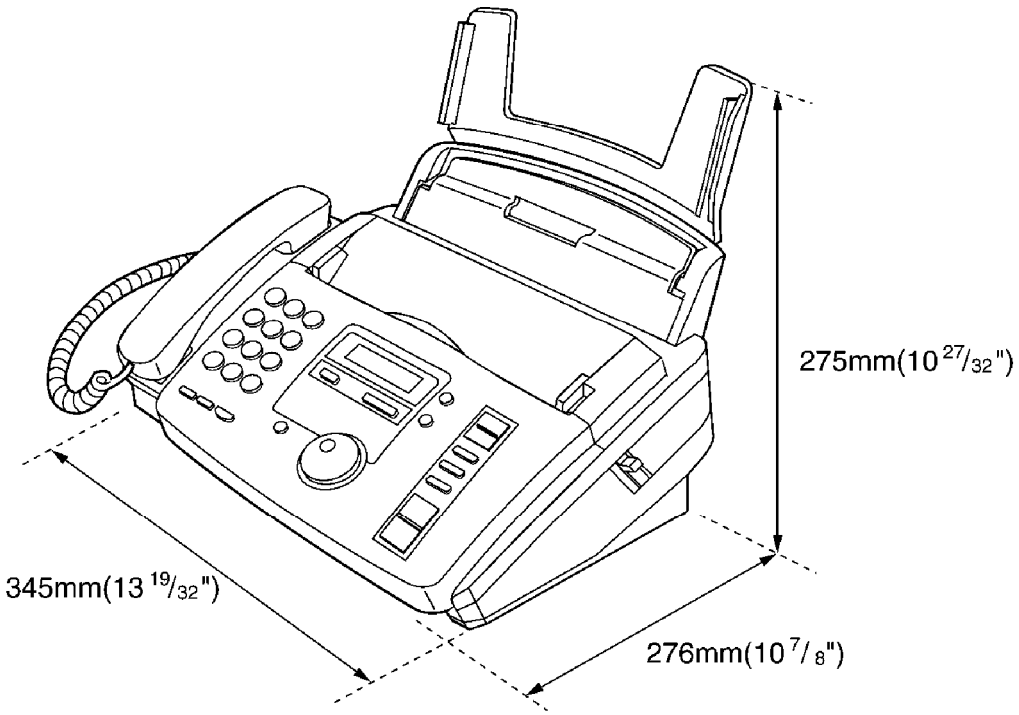
- If you want to connect an answering machine to the unit, you will remove the stopper with your finger and connect the cord to the EXT jack.

1.14. INSTALLATION

1.14.1. INSTALLATION SPACE

The space required to install the unit is shown below.

The dimensions given are necessary for the unit to operate efficiently.



Note:

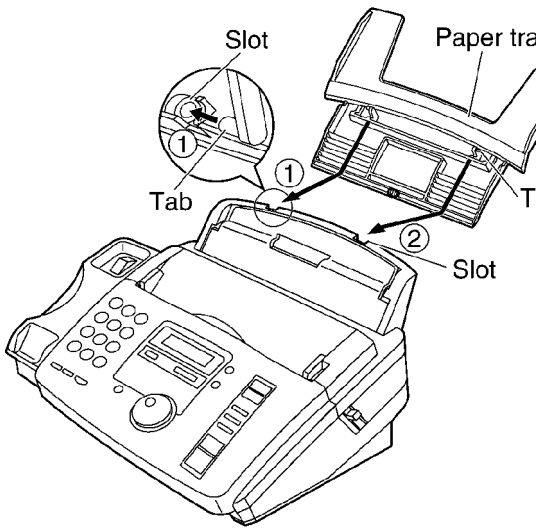
- Avoid excessive heat or humidity.
- Use the unit within the following ranges of temperature and humidity.
- Ambient temperature: 5°C to 35°C
- Relative humidity: 20% to 80% (without condensation)
- Power cord length should be less than 5 meters (16.4 feet). Using a longer cord may reduce the voltage or cause malfunctions.
- Avoid direct sunlight.
- Do not install near devices which contain magnets or generate magnetic fields.
- Do not subject the unit to strong physical shock or vibration.
- Keep the unit clean. Dust accumulation can prevent the unit from functioning properly.
- To protect the unit from damage, hold both sides when you move it.

1.14.2. INSTALLING THE PAPER TRAY

Insert one tab on the paper tray into one slot on the back of the unit (①) and then insert the other tab into the other slot (②).

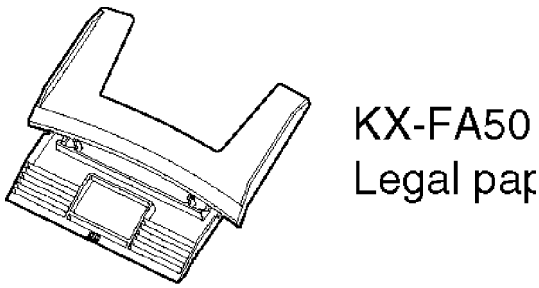
Note:

- Do not place the unit in areas where the paper tray may be obstructed by a wall, etc.



To use legal size paper

Please purchase a legal paper tray Model No. KX-FA50 and install as shown above.



1.14.3. INSTALLING THE RECORDING PAPER

Letter* or legal size recording paper can be loaded. The unit can hold up to 50 sheets of 60 g/m² to 75 g/m² (16 lb. to 20lb.) paper or 30 sheets of 90 g/m² (24 lb.) paper.**

***Letter=216 mm × 279 mm (8 1/2" × 11")**

****Legal=216 mm × 356 mm (8 1/2" × 14")**

If you use legal size paper, please purchase a legal paper tray, Model No. KX-FA50 and install it.

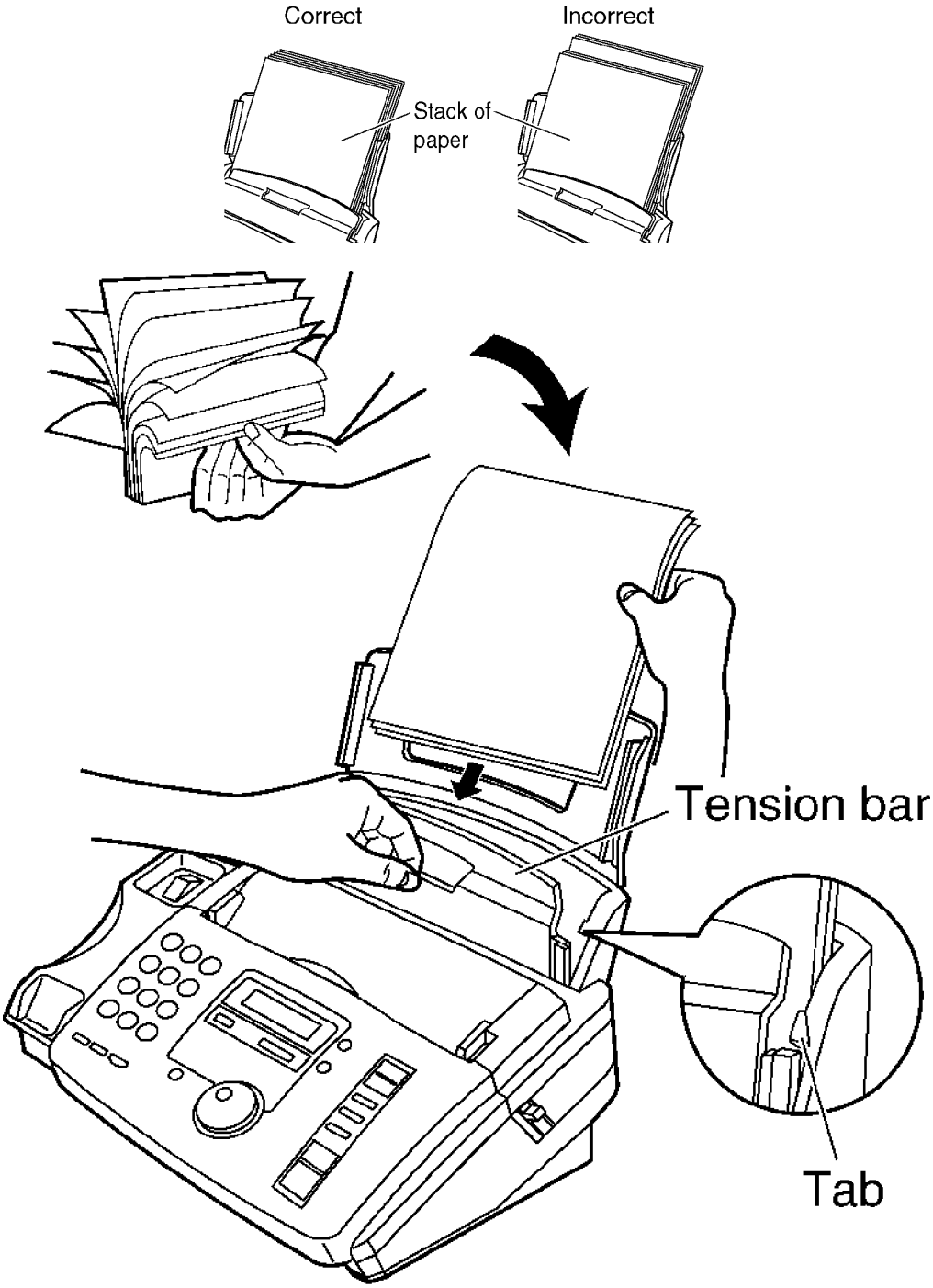
For best results, only use inkjet paper such as Hammermill ® Jet Print. If you use other types of paper, the print quality may be affected.

1. Fan the stack of paper to prevent a paper jam.

2. Pull the tension bar forward and hold open while inserting the paper.

- The paper should not be over the tab.

- If the paper is not inserted correctly, readjust the paper or the paper may jam.



Note for recording paper:

- Avoid paper with a cotton and/or fiber content that is over 20%, such as letterhead paper or paper used for resumes.

- Do not use different types or thicknesses of paper at the same time. This may cause a paper jam.

- Avoid extremely smooth or shiny paper that is highly textured.

- Avoid paper that is coated, damaged or wrinkled.

Note:

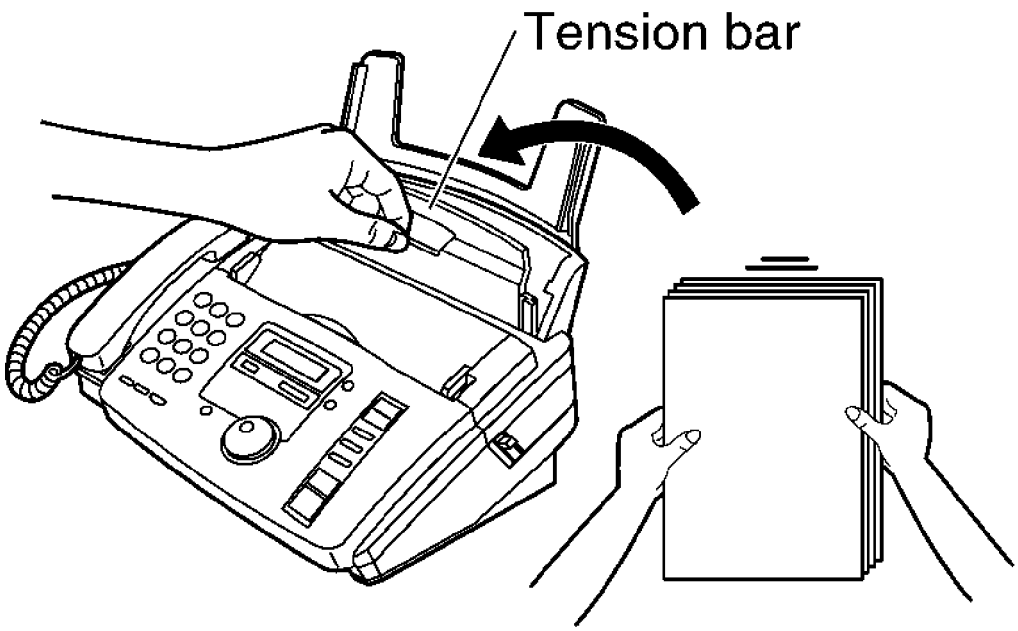
- **Avoid double-sided printing**
- **Do not use paper printed from this unit for double-sided printing with other copiers or printers, or the paper may jam.**
- **Some paper only accepts print on one side. Try using the other side of paper if you are not happy with the print quality.**

Trademarks:

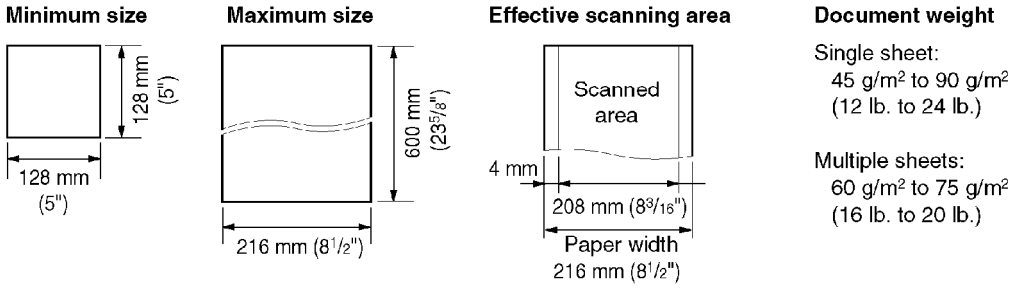
- **Hammermill ® is a registered trademark of INTERNATIONAL PAPER in the United States and/or other countries.**

1.14.4. ADDING PAPER TO THE PAPER TRAY

1. **Pull the cassette open lever forward and remove all of the installed paper.**
2. **Add paper to the removed paper and straighten.**
3. **Fan the stack of paper.**
4. **Pull the tension bar forward and hold open while inserting the paper.**



1.14.5. DOCUMENTS THE UNIT CAN FEED



Note:

- Remove chips, staples or other similar fastening objects.

- Check that ink, paste or correction fluid has dried.

- Do not send the following types of documents. Use copies for fax transmission.

— Chemically treated paper such as carbon or carbon less duplicating paper

— Electrostatically charged paper

— Heavily curled, creased or torn paper

— Paper with a coated surface

— Paper with a faint image

— Paper with printing on the opposite side that can be seen through the front (e.q. newspaper)

1.14.6. SETTING YOUR LOGO

The logo can be your company, division or name.

1. Press [MENU].

Display:

```
1.SYSTEM SET UP
```

2. Press [#], then [0] [2].

```
YOUR LOGO
```

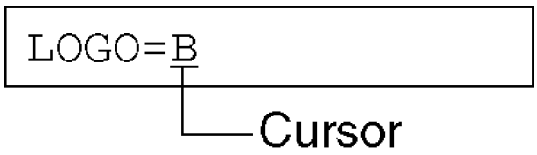
3. Press [SET].

```
LOGO=
```

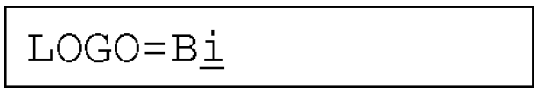
4. Enter your logo, up to 30 characters, by using the dial keypad.

Example: Bill

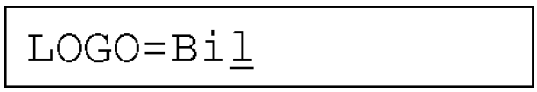
A. Press [2] twice.



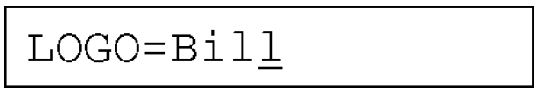
B. Press [4] six times.



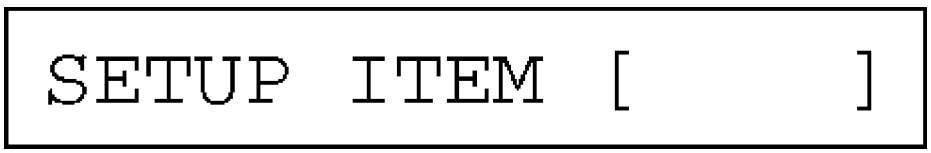
C. Press [5] six times.



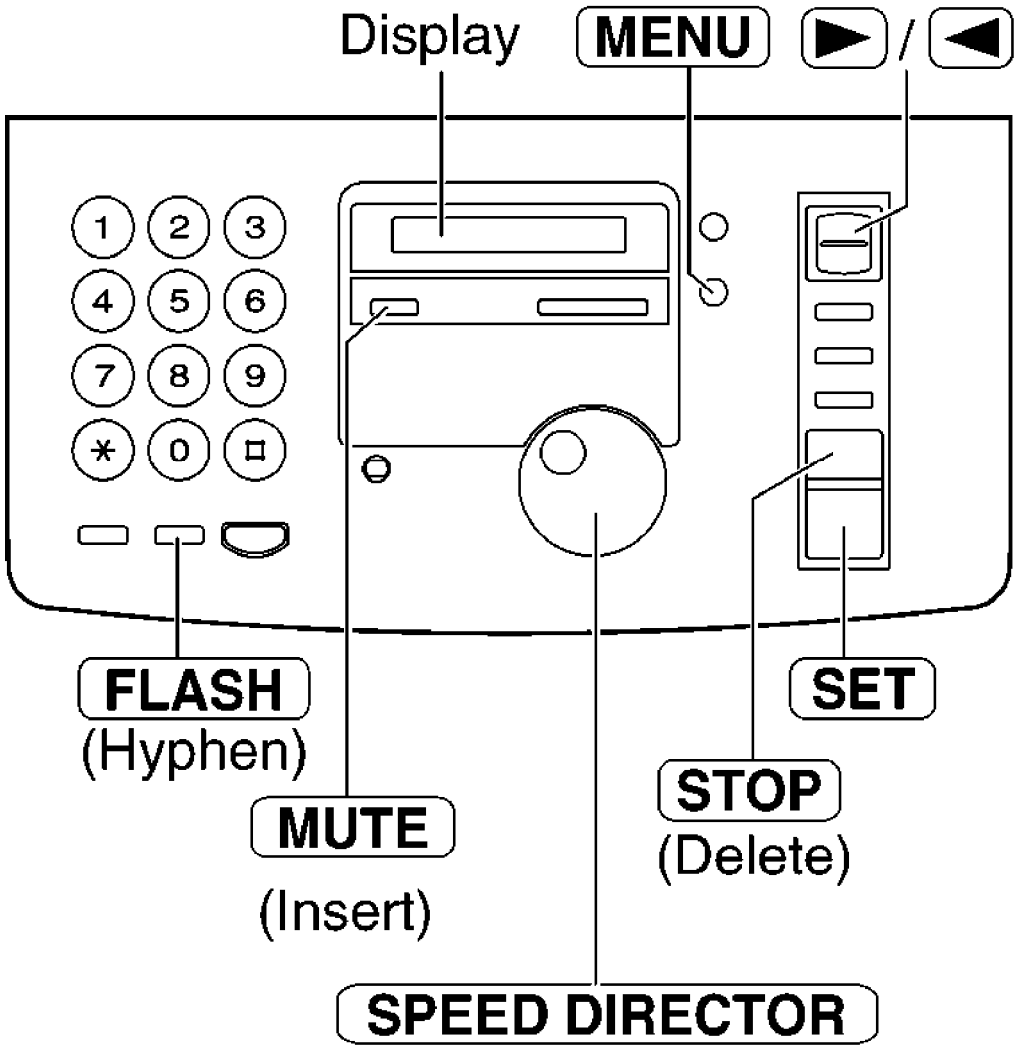
D. Press [►] to move the cursor to the next space and press [5] six times.



5. Press [SET].



6. Press [MENU].



Note:

- You can enter your logo by rotating SPEED DIRECTOR.

To correct a mistake

-Press ▶ or ◀ to move the cursor to the incorrect character, then make the correction.

To delete a character

-Move the cursor to the character you want to delete and press STOP.

To insert a character

1. Press ▶ or ◀ to move the cursor to the position where you want to insert the character.

2. Press MUTE (Insert) to insert a space and enter th

1.14.7. TO SELECT CHARACTERS WITH THE DIAL KEYPAD

Pressing the dial keys will select a character as shown below.

Keys	Characters
1	1 [ ] { } + - / = , . _ ` : ; ? |
2	A B C a b c 2
3	D E F d e f 3
4	G H I g h i 4
5	J K L j k l 5
6	M N O m n o 6
7	P Q R S p q r s 7
8	T U V t u v 8
9	W X Y Z w x y z 9
0	0 ( ) 〈 〉 ! " # $ % & ¥ * @ ^ ' →
FLASH	**Hyphen** button (To insert a hyphen.)
MUTE	**Insert** button (To insert one character or one space.)
STOP	**Delete** button (To delete a character.)
	▶ key (To move the cursor to the right.) To enter another character using the same number key, move the cursor to the next space.
	◀ key (To move the cursor to the left.)

1.14.8. TO SELECT CHARACTERS USING THE SPEED DIRECTOR

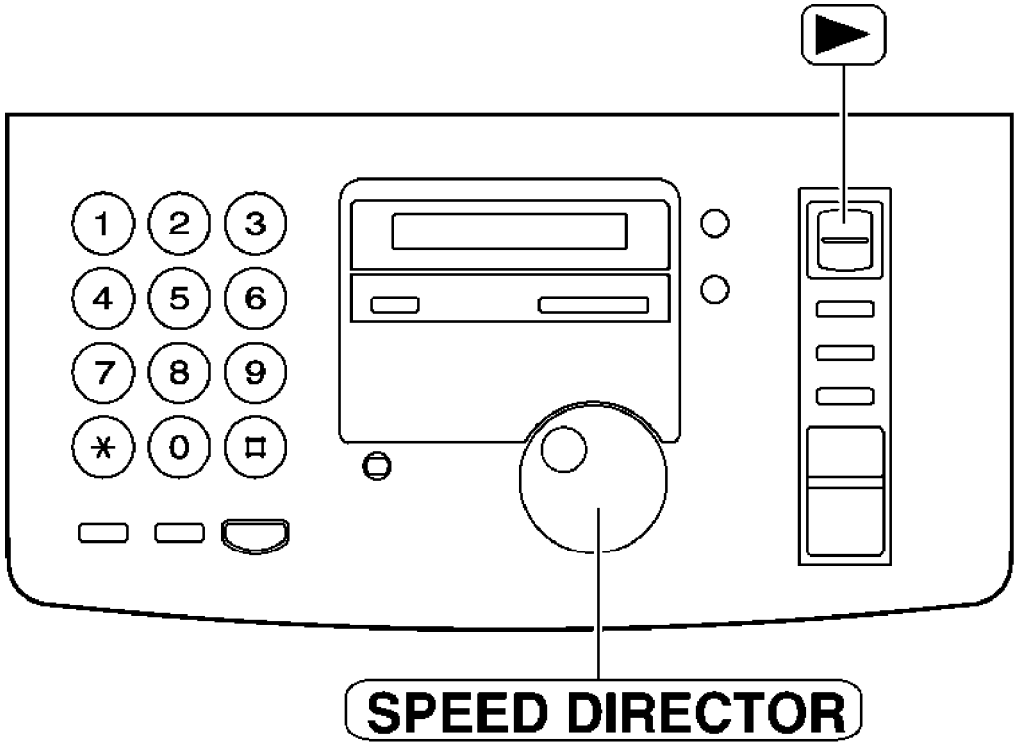
Instead of pressing the dial keys, you can select characters using the SPEED DIRECTOR.

1. Rotate SPEED DIRECTOR unit the desired character is displayed.

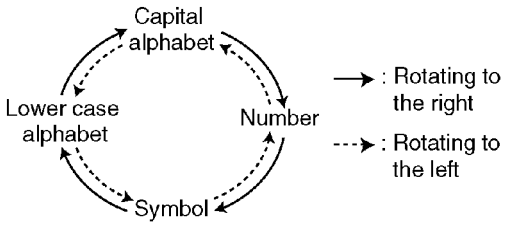
2. Press ▶ to move the cursor to the next space.

- The character displayed in step 1 is inserted.

3. Return to step 1 to enter the next character.



Display order of characters



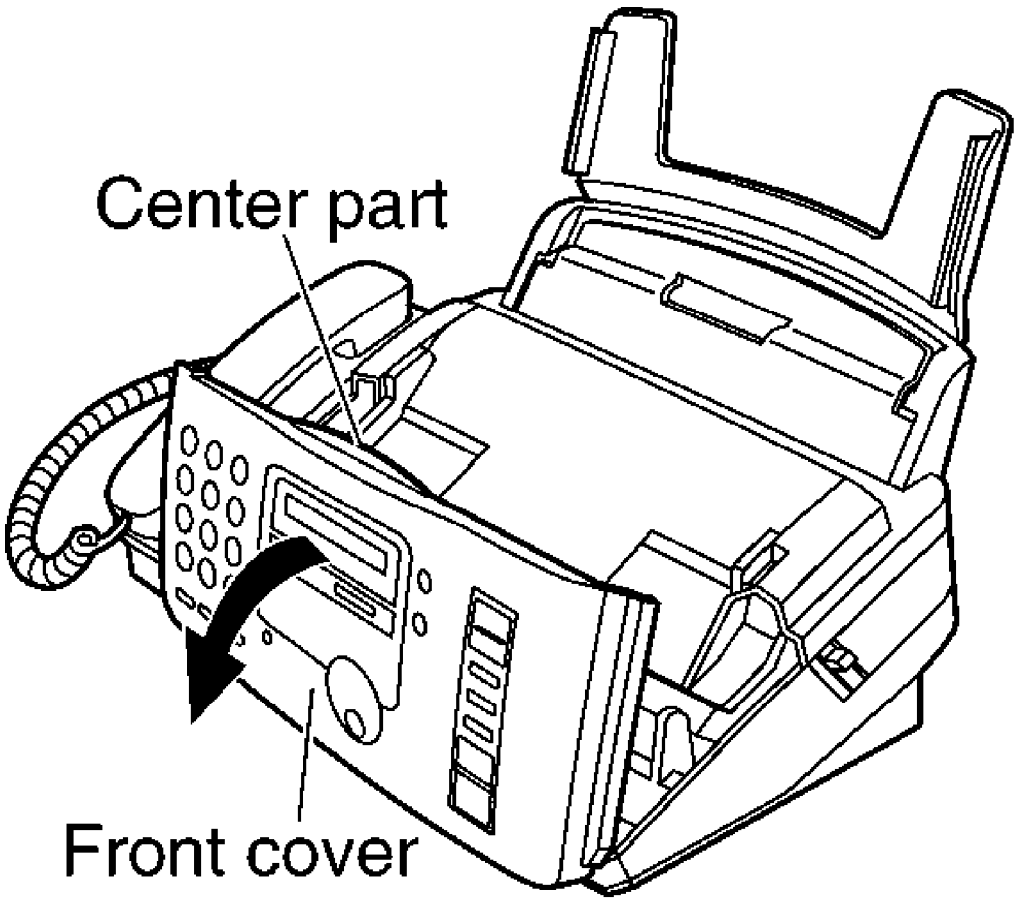
1.14.9. REPLACING THE FILM CARTRIDGE

When the unit runs out of ink film, the following message will be displayed.
Display:

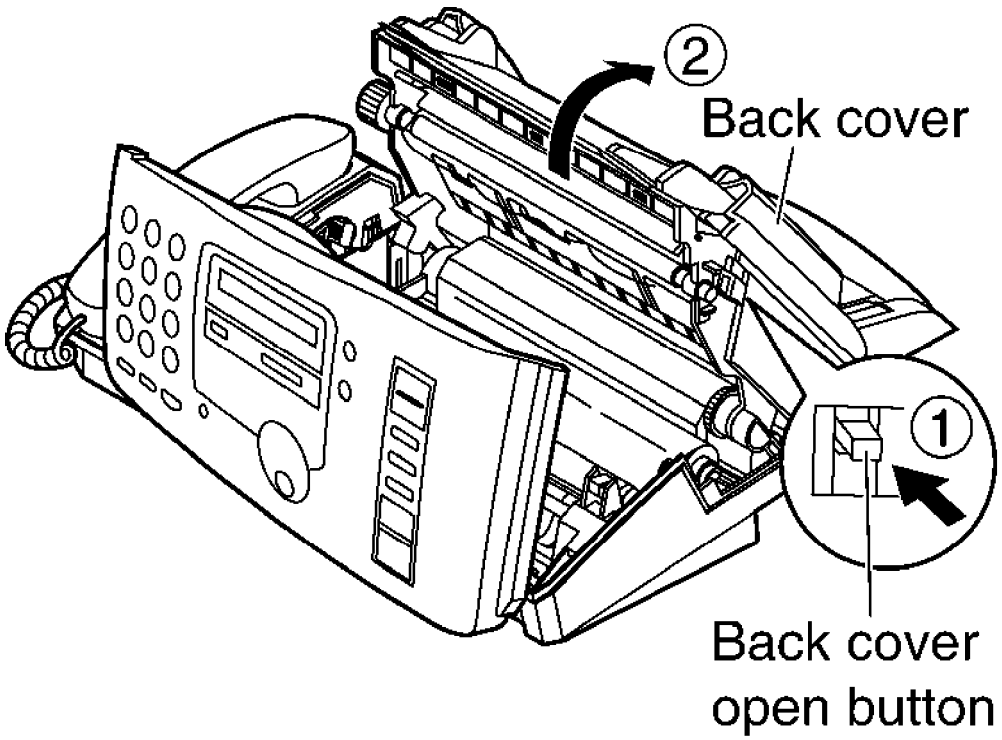
CHECK FILM

Install a new ink film. The following ink films are available for replacement. Each roll prints about 150 letter size pages.
Refer to 1.10. OPTIONAL ACCESSORIES.()
Model No. KX-FA55A: Replacement film (2 rolls)

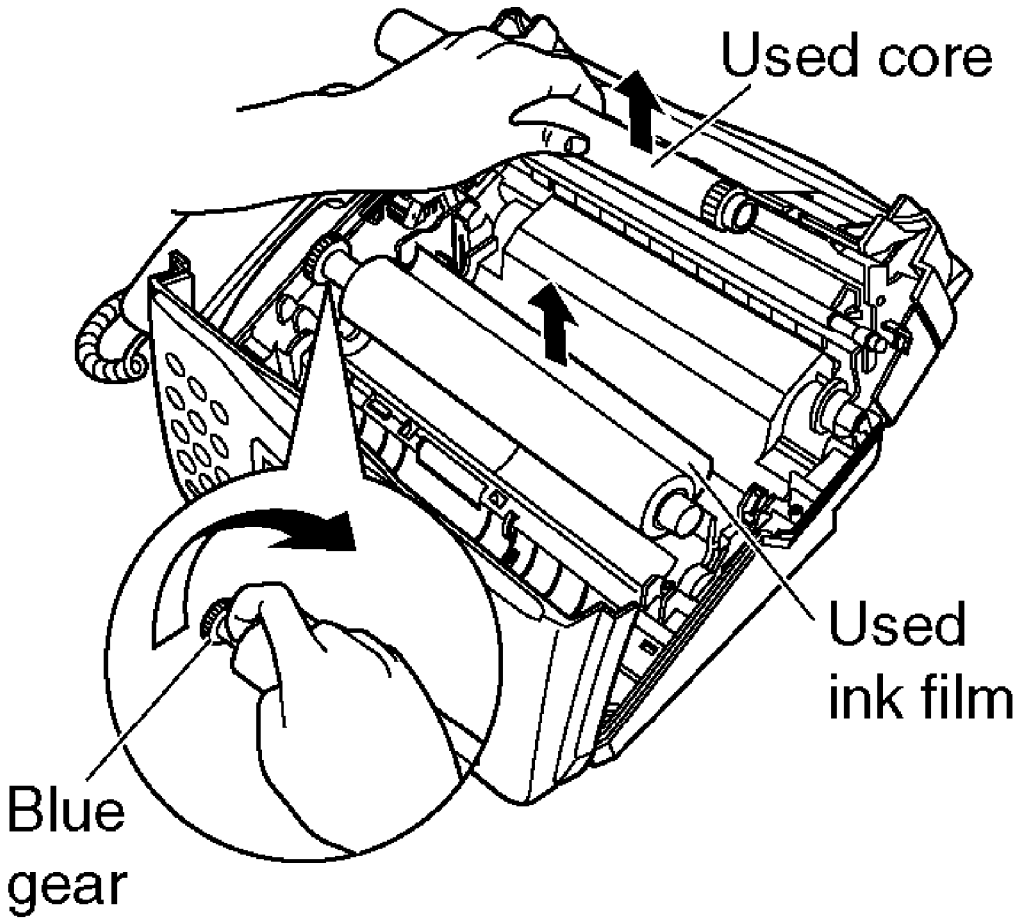
1. Open the front cover by pulling up the center part.



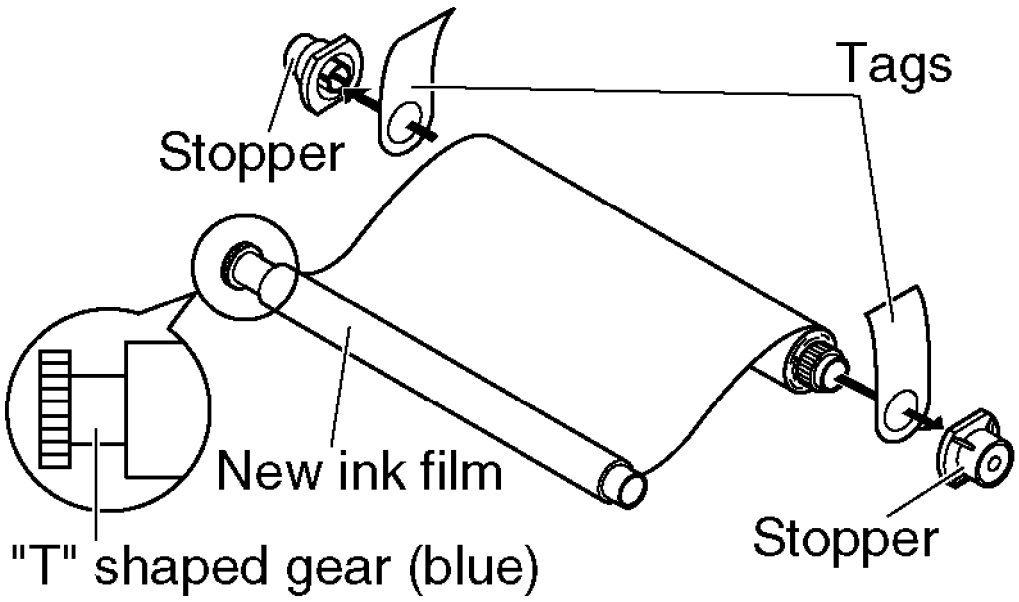
2. Push the back cover open button (①) and open the back cover (②).



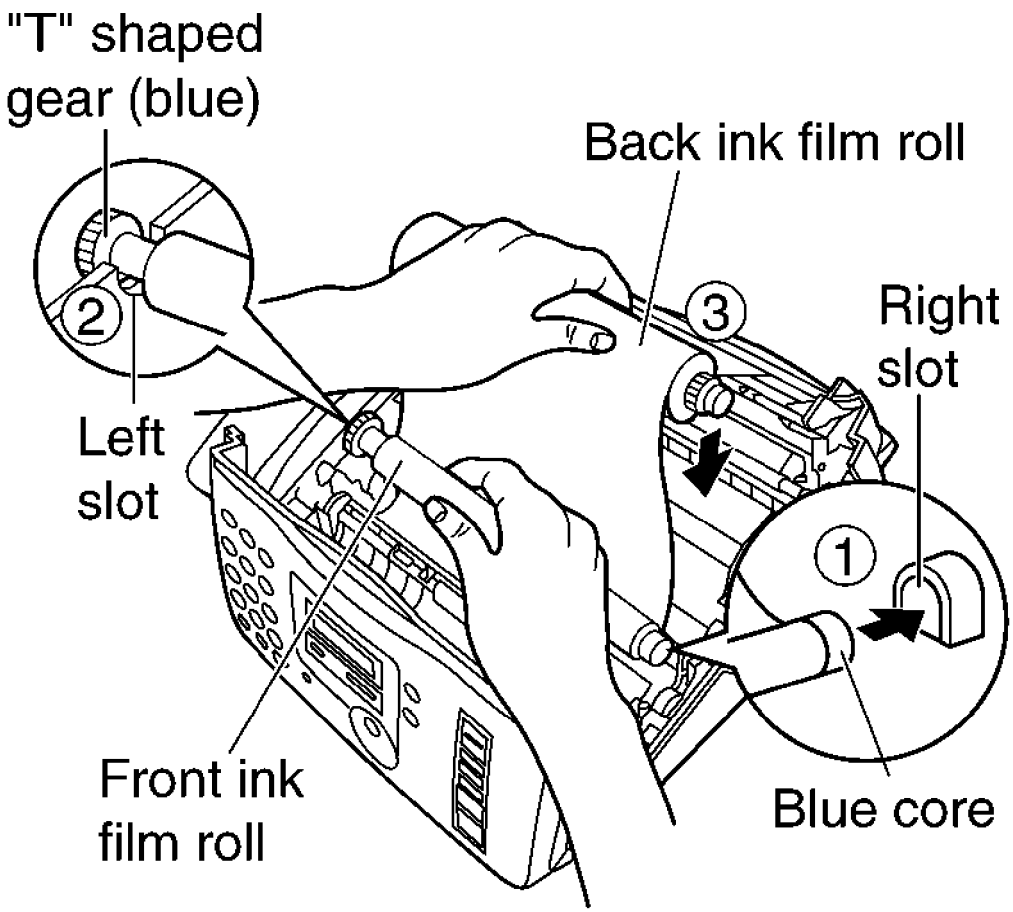
3. **Pull up the blue gear side and remove the used ink film. Remove the used core.**



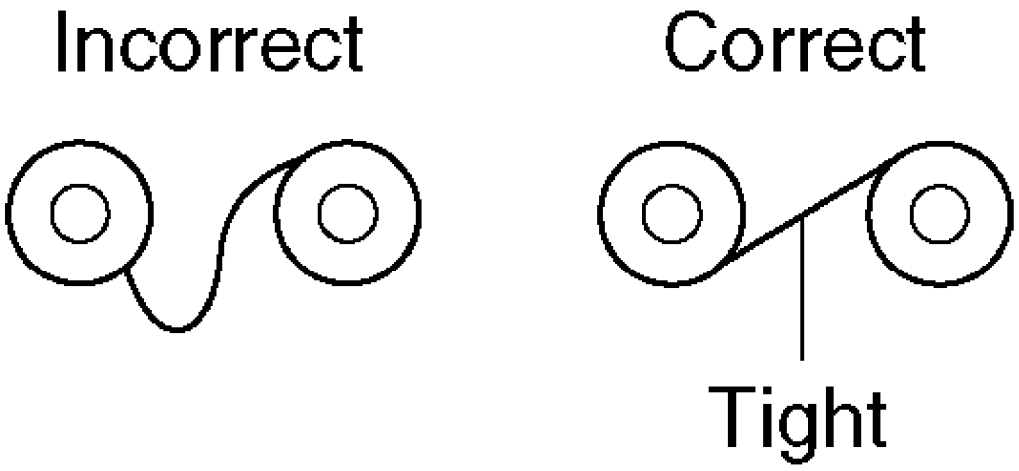
4. **Remove the stoppers and tags from the new ink film. Find the “T” shaped gear (blue).**

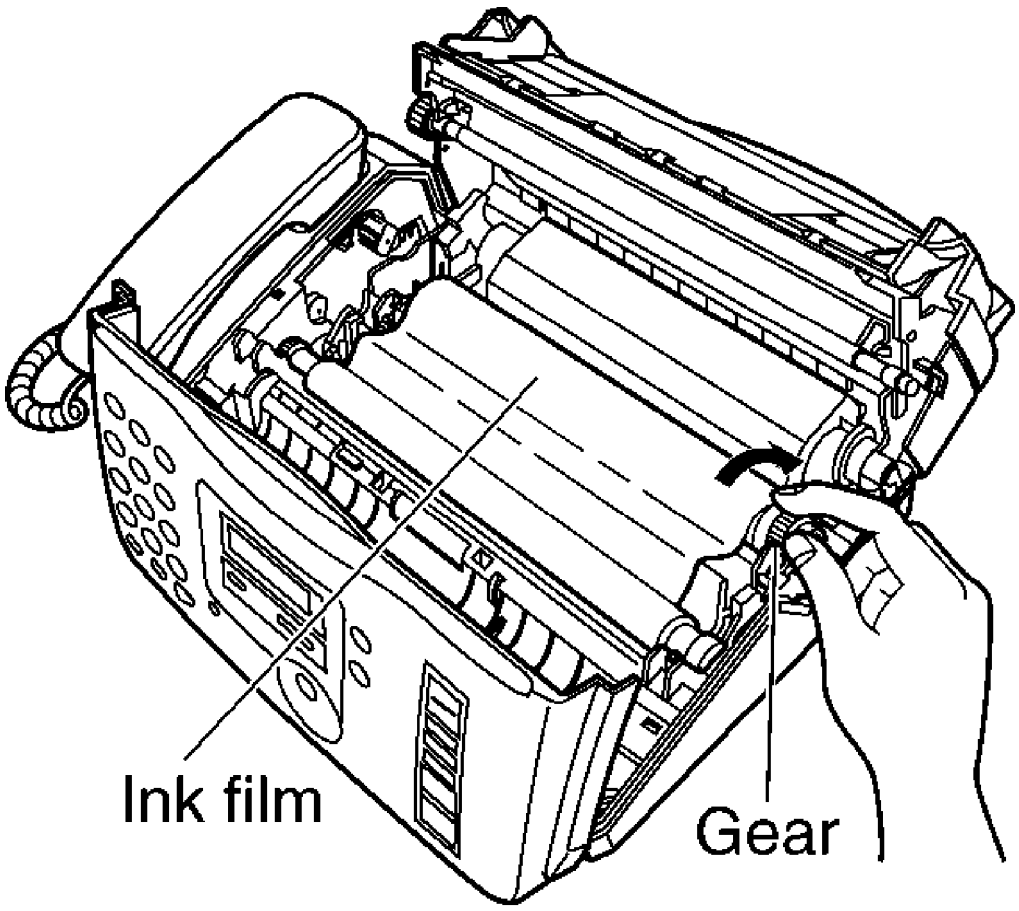


5. Insert the blue core of the front ink film roll into the right slot of the unit (①). Insert the "T" shaped gear (blue) into the left slot of the unit (②). / Insert the back ink film roll (③).



6. If the ink film is slack, tighten it by winding the gear.





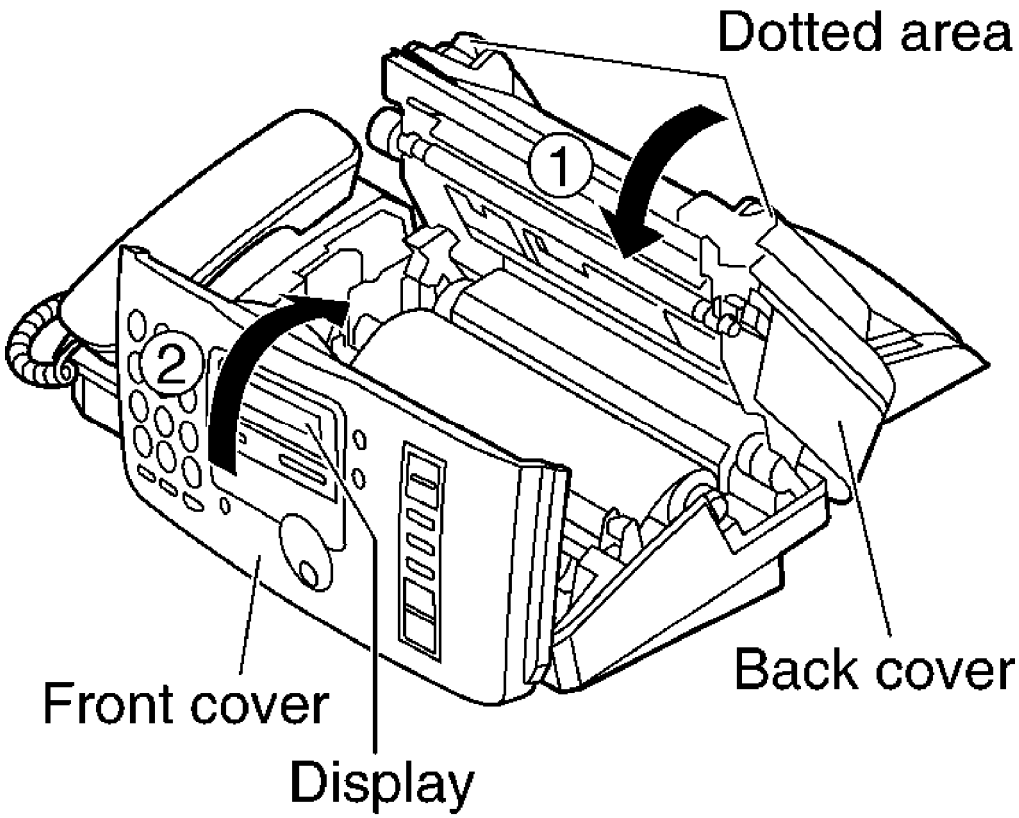
7. Close the back cover securely by pushing down on the dotted area at both ends (①). / Close the front cover securely (②).

- The following message will be displayed while the unit is checking that there is no slack on the ink film.
Display:

PLEASE WAIT

Note:

- The ink film is completely safe to touch, and will not rub off on your hands like carbon paper.



1.15. MAINTENANCE ITEMS AND COMPONENT LOCATIONS

1.15.1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

1. Periodic maintenance
Inspect the equipment periodically and if necessary, clean any contaminated parts.

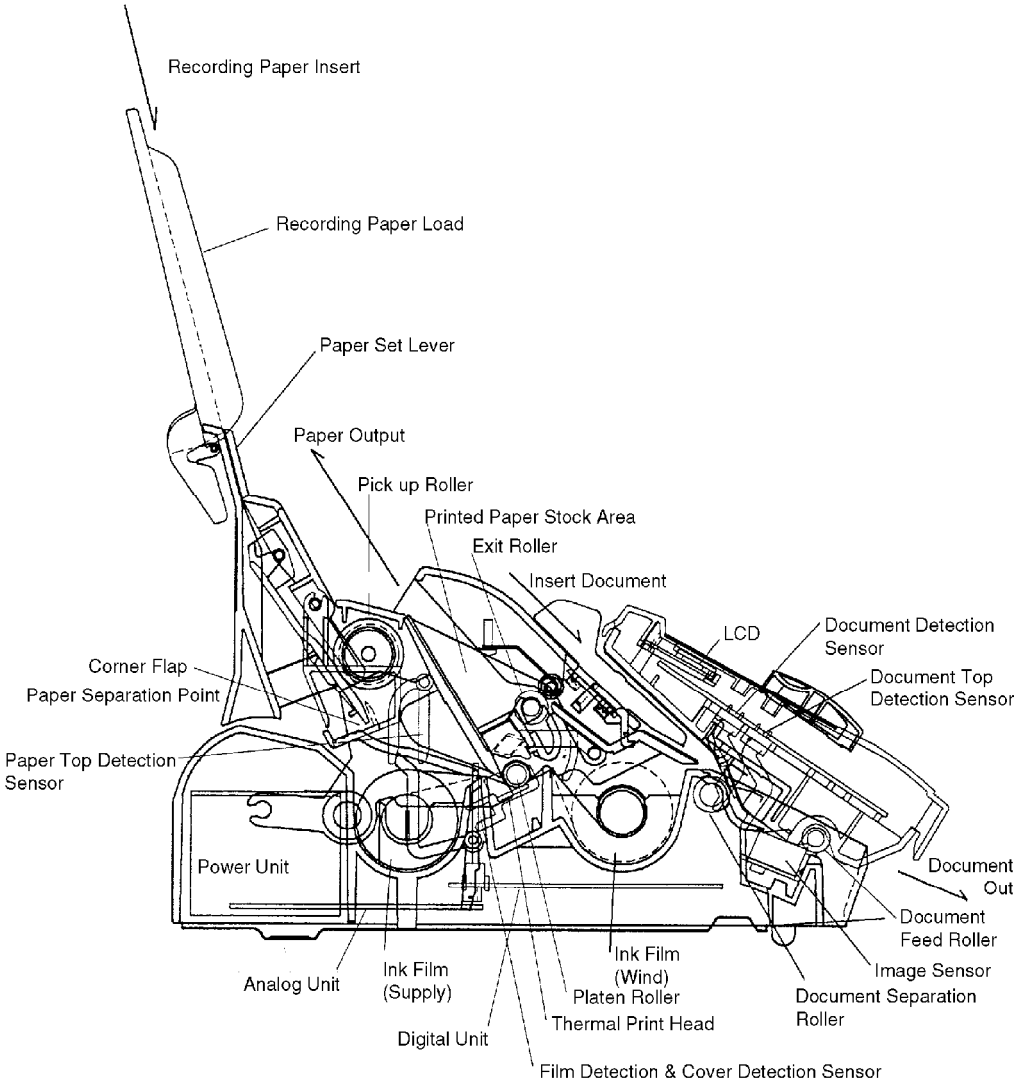
2. Check for breakdowns
Look for problems and consider how they arose.
If the equipment can be still used, perform copying, self testing or communication testing.

3. Check equipment
Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, receiver

or the telephone line.

4. **Determine causes**
   Determine the causes of the equipment problem by troubleshooting.
5. **Equipment repairs**
   Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem will not recur.
6. **Confirm normal operation of the equipment**
   After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.
7. **Record keeping**
   Make a record of the measures taken to rectify the problem for future reference.

1.15.2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS



1.15.2.1. MAINTENANCE LIST

NO.	OPERATION	CHECK	REMARKS
1	Document Path	Remove any foreign matter such as paper.	—
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	Refer to 1.15.3. MAINTENANCE().
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper and film cartridge before cleaning.	—
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	Refer to 1.15.3. MAINTENANCE().
5	Sensors	Hook switch (SW101), Paper top sensor (PS501), Film end (SW501), Cover open switch (SW501), Document top switch (SW353), Document set switch (SW352) and Confirm the operation of the sensors.	See 1.15.2. MAINTENANC CHECK ITEMS/COMPONE LOCATIONS() and 4.4. HC TO REMOVE THE ANALO DIGITAL AND POWER BOARDS AND AC INLET (
6	Glass	If the glass is dirty, clean them with a dry soft cloth.	Refer to 1.15.3. MAINTENANCE().
7	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	—

1.15.2.2. MAINTENANCE CYCLE

No.	Item	Cleaning Cycle	Replacement	
			Cycle	Procedu
1	Separation Roller (Ref. No. 117)	3 months	7 years* (100,000 documents)	Refer to 4.6. HO REMOVE THE SEPARATION R
2	Separation Rubber (Ref. No. 5)	3 months	7 years (100,000 documents)	Refer to 1.15.2. MAINTENANCE ITEMS/COMPON LOCATIONS().
3	Feed Rollers (Ref. No. 4)	3 months	7 years (100,000 documents)	Refer to 4 DISAS INSTRUCTIONS
4	Thermal Head (Ref. No. 33)	3 months	7 years (100,000 documents)	Refer to 4.8. HO REMOVE THE T HEAD().
5	Platen Roller (Ref. No. 93)	3 months	7 years (100,000 documents)	Refer to 4.9. HO REMOVE THE P ROLLER, BACK
6	Pickup Roller (Ref. No. 72)	3 months	7 years (100,000 documents)	Refer to 4.10. H REMOVE THE P ROLLER().

1.15.3. MAINTENANCE

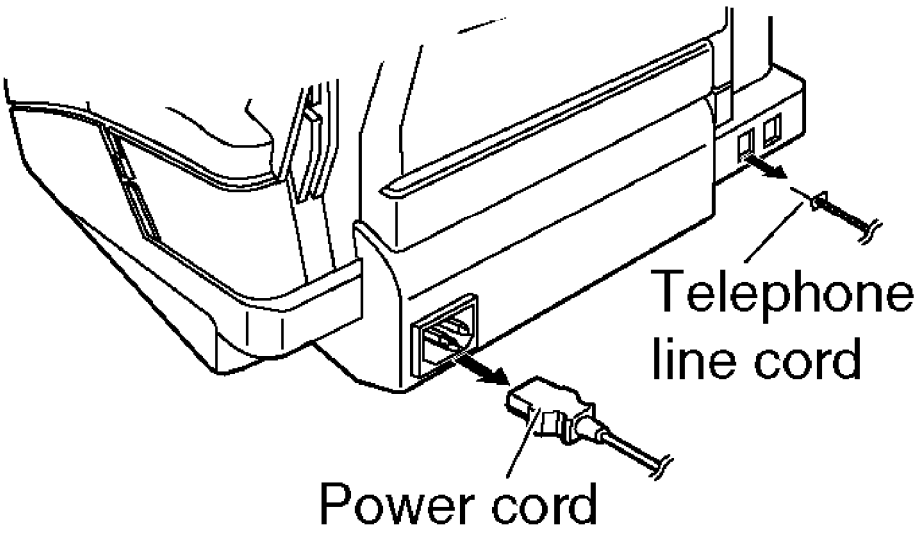
1.15.3.1. CLEANING THE DOCUMENT FEEDER UNIT

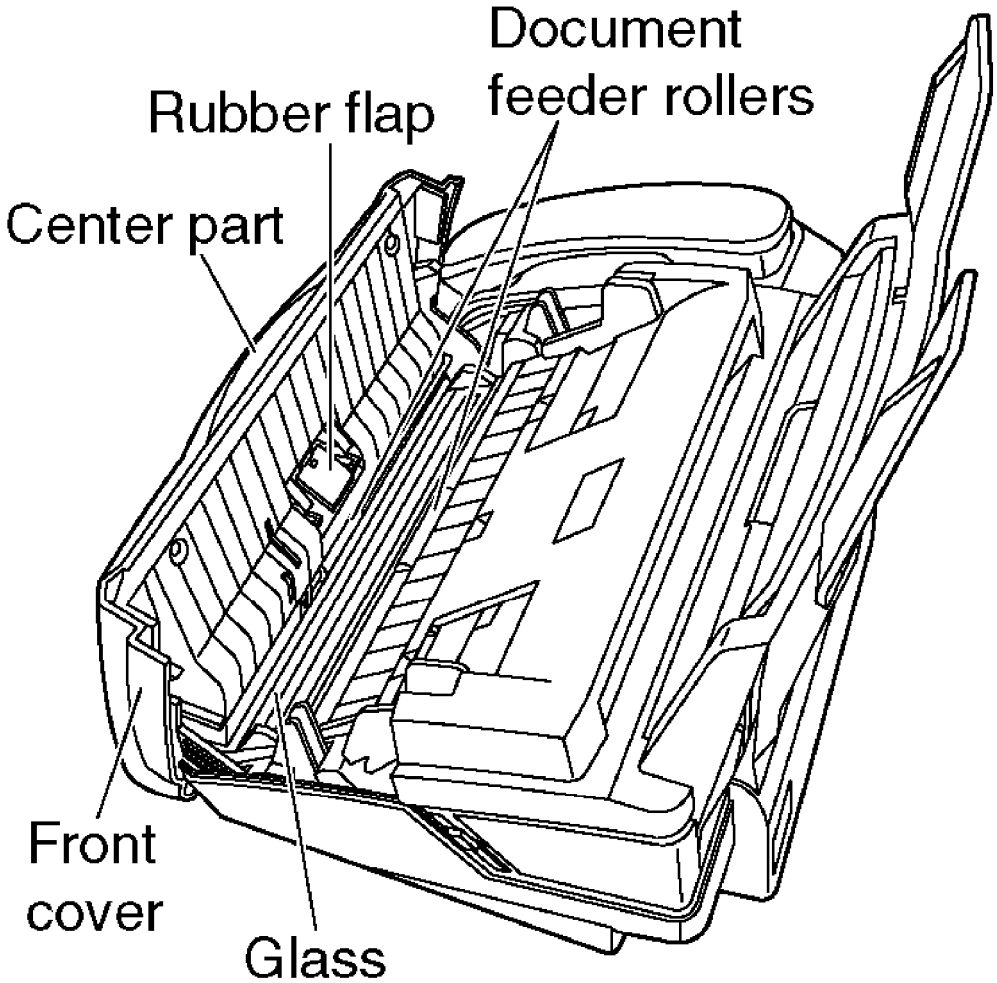
If misfeeding occurs frequently or if dirty patterns or bands appear on a transmitted document or on the original of a copied document, clean the document feeder.

1. **Disconnect the power cord and the telephone line cord.**
2. **Open the front cover by pulling up the center part.**
3. **Clean the document feed rollers and rubber flap with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.**
4. **Clean the glass with a soft dry cloth.**
5. **Close the front cover securely.**
6. **Connect the power cord and the telephone line cord.**

Caution:

- Do not use paper products, such as paper towels or tissues, to clean the inside of the unit.





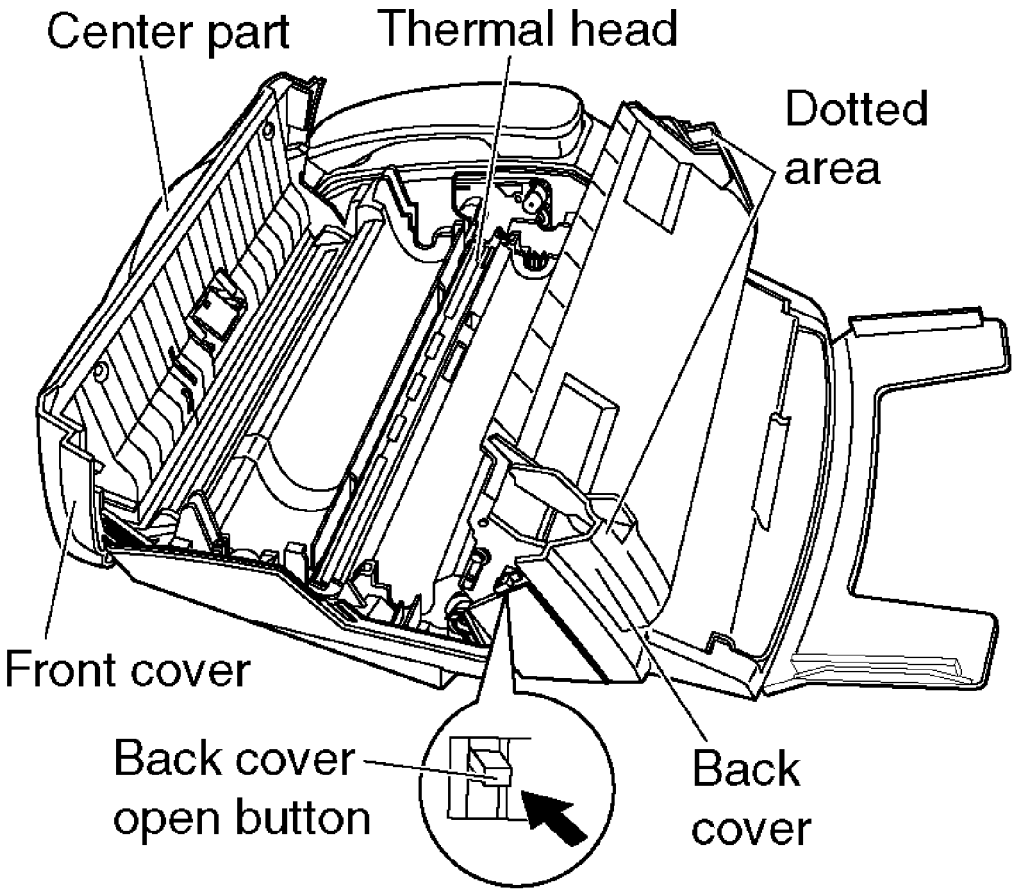
1.15.3.2. CLEANING THE THERMAL HEAD AND BLACK BAR

If dirty patterns or black or white bands appear on a copied or received document, clean the thermal head.

1. Disconnect the power cord and the telephone line cord.
2. Open the front cover by pulling up the center part.
3. Open the back cover by pushing the back cover open button.
4. Clean the thermal head with a cloth moistened with isopropyl rubbing alcohol, and let it dry thoroughly.
5. Close the back cover securely by pushing down on the dotted area at both ends. Close the front cover securely.
6. Connect the power cord and the telephone line cord.

Caution:

- To prevent a malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your fingers.



1.15.3.3. CLEANING THE PICKUP ROLLER

Refer to 4.10. HOW TO REMOVE THE PICKUP ROLLER.()

2. TROUBLESHOOTING GUIDE

2.1. TROUBLESHOOTING SUMMARY

2.1.1. TROUBLESHOOTING

After confirming the problem by asking the user, troubleshoot according to the instructions and observe the following precautions.

2.1.2. PRECAUTIONS

1. **If there is a problem with the print quality or the paper feed, first check if the installation space and the print paper meets the specifications, the paper selection lever/paper thickness lever is set correctly, and the paper is set correctly without any slack.**
2. **Before troubleshooting, first check that the connectors and cables are connected correctly (not loose).**
   If the problem occurs randomly, check it very carefully.
3. **When connecting the AC power cord with the unit and checking the operation, exercise utmost care when handling electric parts in order to avoid electric shocks and short-circuits.**
4. **After troubleshooting, double check that you have not forgotten any connectors, left any loose screws, etc.**
5. **Always test to verify that the unit is working normally.**

2.1.3. WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE HELP FUNCTION

- How to use:

1. **press** HELP.
2. **press** SPEED DIRECTOR **until the desired item is displayed.**
3. **press** SET.

2.2. USER RECOVERABLE ERRORS

If the unit detects a problem, one or more of the following messages will appear on the display.

DISPLAY MESSAGE	CAUSE AND REMEDY
CALL SERVICE	• There is something wrong with the unit. Contact our service personnel. [This error is displayed when the thermal head does not warm up. Check the thermistor on the thermal head and connector lead. (for technicians)]
CALL SERVICE2	• This message appears when the gear is not in an idle state. Check the GEAR BLOCK.
COVER OPEN ↕ CHECK FILM	• The covers are open. Close them. • The ink film is empty. Replace the ink film with a new one. • The ink film is not installed. Install it. • The ink film is slack. Tighten it.
CHECK DOCUMENT	• The document is not fed into the unit properly. Reinsert the document. If misfeeding occurs frequently, clean the document feeder rollers and try again. If the problem remains, adjust the feeder pressure. (Refer to **3 ADJUSTMENT** and **2.2.1. DOCUMENT JAM**)
CHECK MEMORY	• Memory (telephone numbers, parameters, etc.) has been erased. Re-program. [The backup battery on the top of the digital board may be low or dead, so check it.]
CHECK PAPER	• The recording paper is not installed or the unit has run out of paper. Install paper and press SET to clear the message. • The recording paper is not fed into the unit properly. Reinstall paper and press SET to clear. • The recording paper has jammed near the recording paper entrance. Clear the jammed paper and press SET to clear the message. Do not install folded or heavily curled paper.
FAX IN MEMORY	• The unit has a document in memory. See the other displayed message instructions to print out the document.
FAX MEMORY FULL	• Memory is full of received documents due to lack of recording paper or a recording paper jam, etc. Install paper or clear the jammed paper. • When performing memory transmission, the document being stored exceeds the memory capacity of the unit. Transmit the entire document manually.
SPD-DIR FULL	• There is no space to store new stations in the SPEED DIRECTOR directory. Erase unnecessary stations.
MEMORY FULL	• When making a copy, the document being stored exceeds the memory capacity of the unit. Press STOP to clear the message. Divide the document and try again.
MODEM ERROR	• There is something wrong with the modem circuit.
NO FAX REPLY	• The other party's fax machine is busy or has run out of recording paper. Try again.
PAPER JAMMED	• A recording paper jam occurred. Clear the jammed paper. [If the printout jams, please refer to **2.2.2. RECORDING PAPER JAMS**.]

Note:

The explanations given in the [ ] are for servicemen only.

CROSS REFERENCE:

2.2.1. DOCUMENT JAMS()
2.2.2. RECORDING PAPER JAMS()
3 ADJUSTMENTS()

DISPLAY MESSAGE	CAUSE AND REMEDY
PLEASE WAIT	• The unit is checking that there is no slack on the film. Wait for a while.
REDIAL TIME OUT	• The other party's fax machine is busy or has run out of recording paper. Try again.
REMOVE DOCUMENT	• The document is jammed. Remove the jammed document. • Attempted to transmit a document longer than 600 mm (23 5/8"). Press the STOP to remove the document. Divide the document into two or more sheets and try again. [Alternately, turn off service code #559 to enable sending of documents longer than 600 mm.] (Refer to **2.2.1. DOCUMENT JAMS**)
TRANSMIT ERROR	• A transmission error occurred. Try again.
UNIT OVERHEATED	• The unit is too hot. Let the unit cool down. [If many copies are nearly all black, this message will be displayed. When this occurs, open the front cover and let the unit cool down.]

CROSS REFERENCE:
2.2.1. DOCUMENT JAMS()

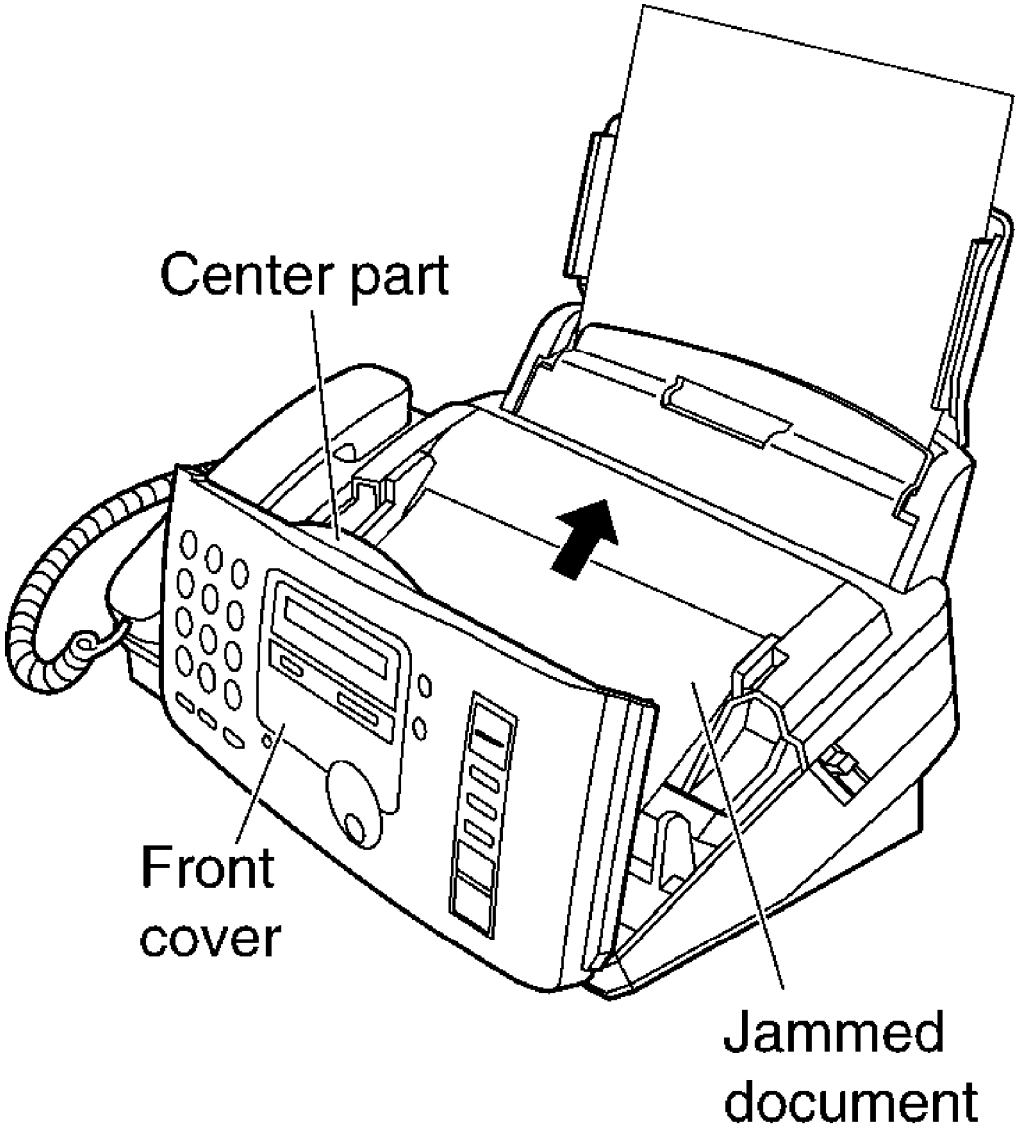
Note:

The explanations given in the [ ] are for servicemen only.

2.2.1. DOCUMENT JAMS

If the unit does not release the document during feeding, remove the jammed document as follows.

1. Open the front cover by pulling up the center part.
2. Remove the jammed document carefully.
3. Close the front cover securely.



Note:

- Do not pull out the jammed paper forcibly before opening the front cover.

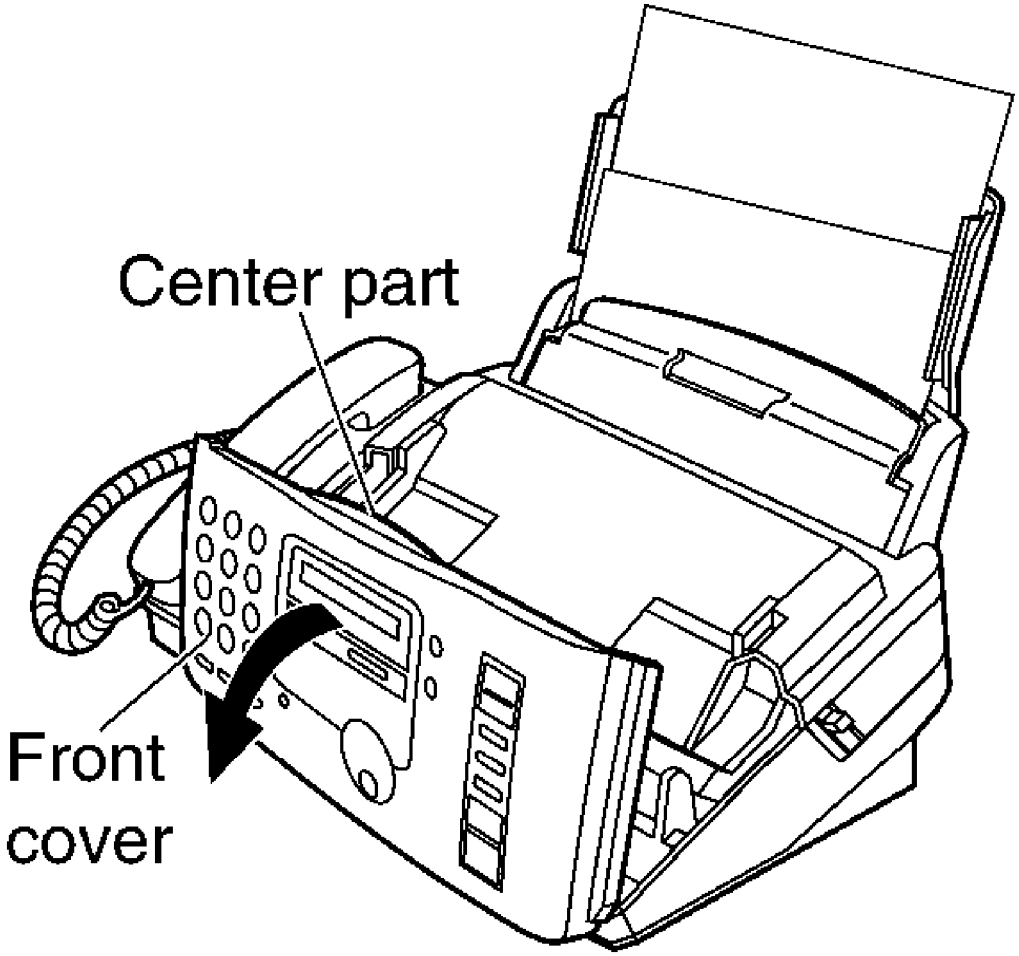
2.2.2. RECORDING PAPER JAMS

If the unit does not eject any recording paper during reception or copying, the recording paper has jammed and the display will show the following massage.
When paper has jammed under the film cartridge
Display:

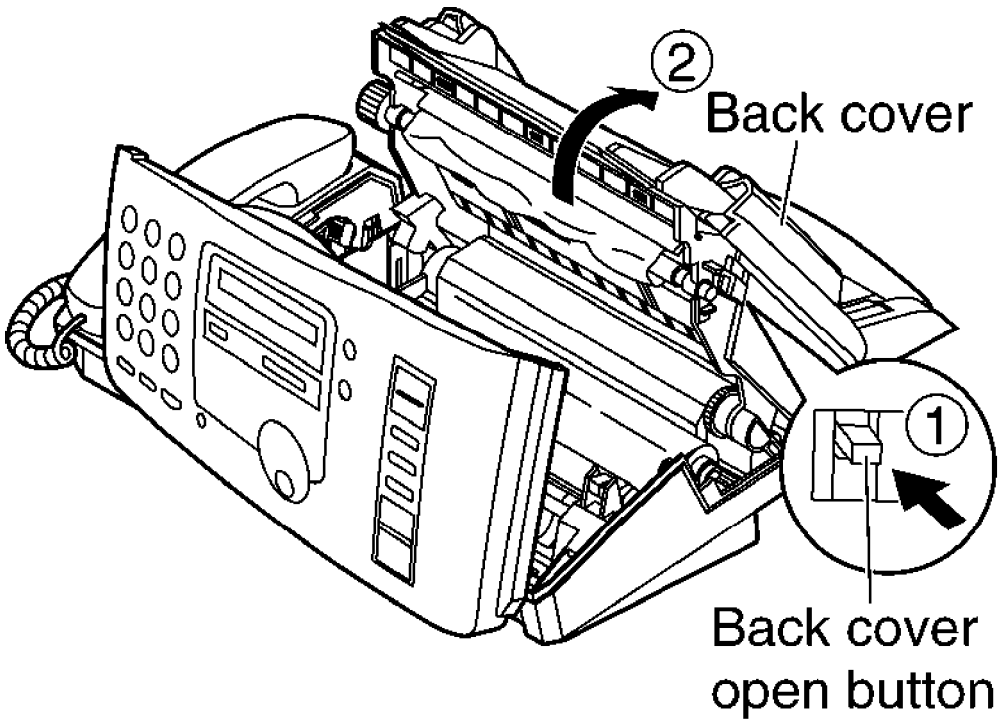
PAPER JAMMED

Remove the jammed paper as follows.

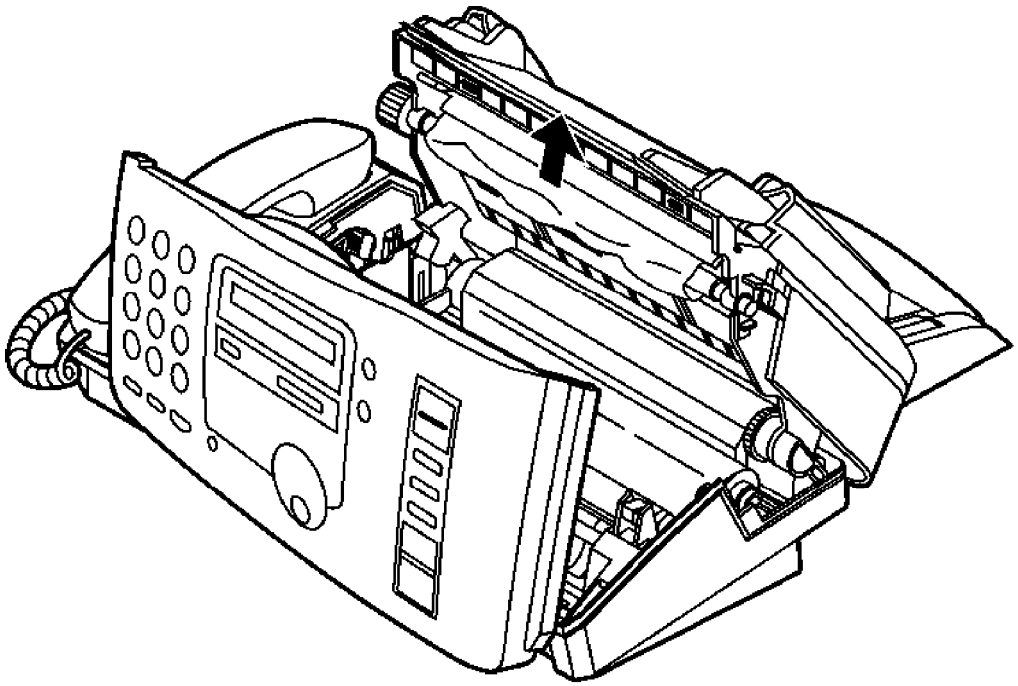
1. Open the front cover by pulling up the center part.



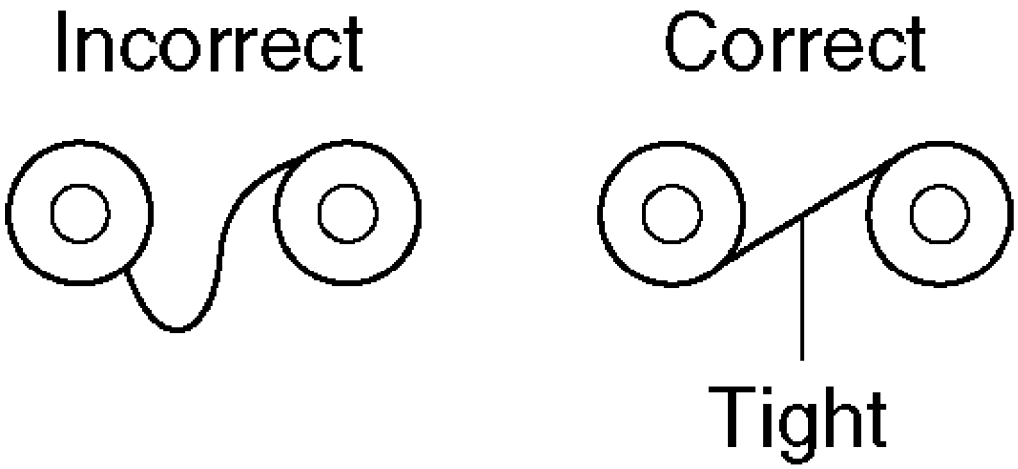
2. Push the back cover open button (①) and open the back cover (②).



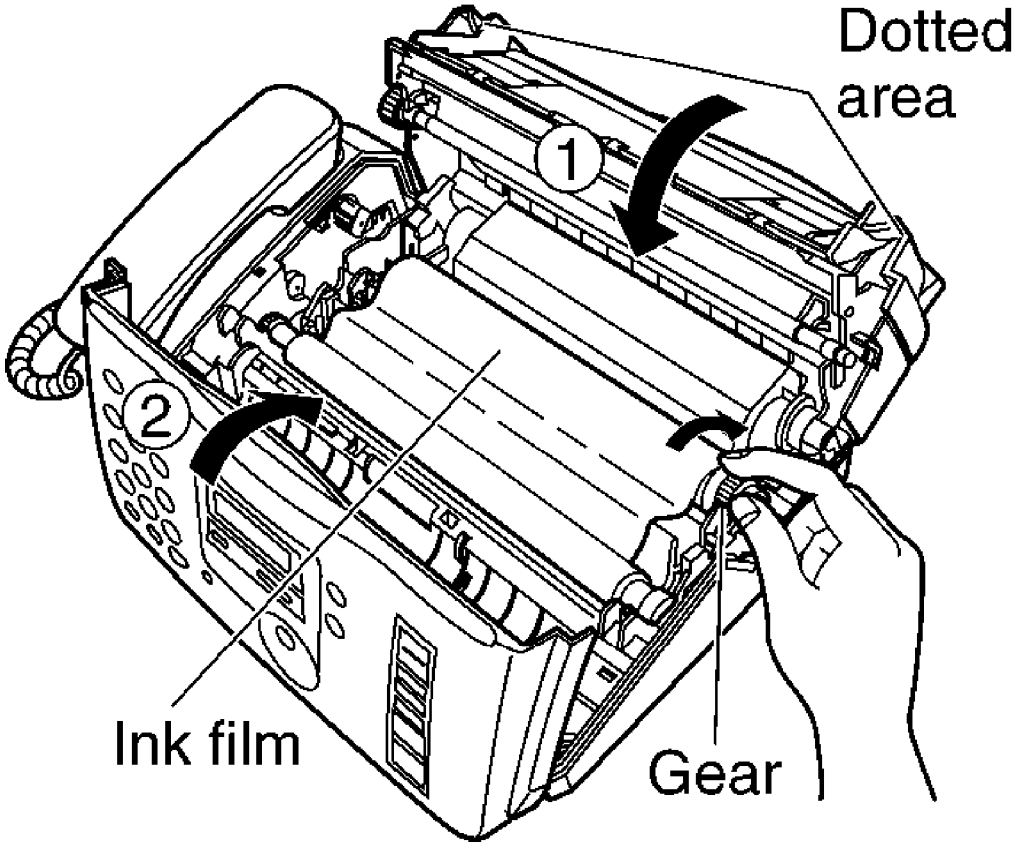
3. Remove the jammed recording paper.



4. If the ink film is slack, tighten it by winding the gears.



5. Close the back cover securely by pushing down on the dotted area at both ends (①). / Close the front cover securely (②).



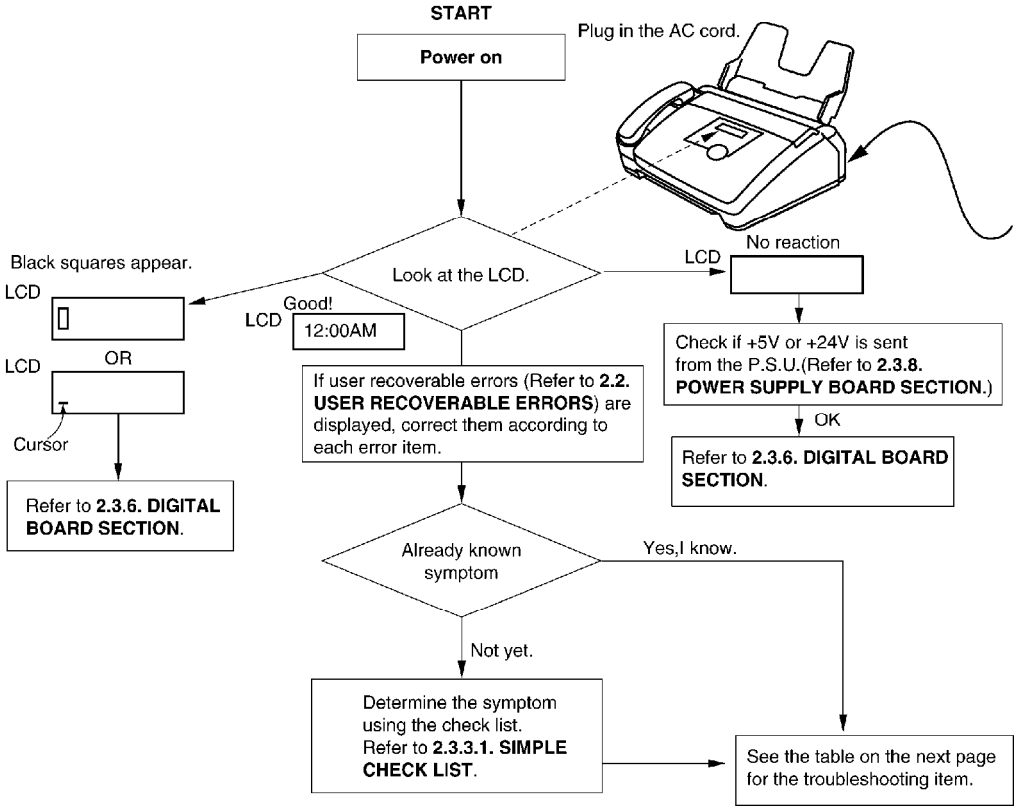
2.3. TROUBLESHOOTING DETAILS

2.3.1. OUTLINE

Troubleshooting is for recovering quality and reliability by determining the broken component and replacing, adjusting or cleaning it as required. First, determine the problem then decide the troubleshooting method. If you have difficulty finding the broken part, determine which board is broken. (For example: the Digital PCB, Analog PCB, etc.) The claim tag from a customer or dealer may use different expressions for the same problem, as they are not a technician or engineer. Using your experience, test the problem area corresponding to the claim. Also, returns from a customer or dealer often have a claim tag. For these cases as well, you need to determine the problem. Test the unit using the simple check list on 2.3.3.1. SIMPLE CHECK LIST(). Difficult problems may be hard to determine, so repeated testing is necessary.

2.3.2. STARTING TROUBLESHOOTING

Determine the symptom and the troubleshooting method.


START
Power on
Plug in the AC cord.
Look at the LCD.
Black squares appear.
LCD
OR
Cursor
Refer to 2.3.6. DIGITAL BOARD SECTION.
Good!
LCD
12:00AM
If user recoverable errors (Refer to 2.2. USER RECOVERABLE ERRORS) are displayed, correct them according to each error item.
LCD
No reaction
Check if +5V or +24V is sent from the P.S.U.(Refer to 2.3.8. POWER SUPPLY BOARD SECTION.)
OK
Refer to 2.3.6. DIGITAL BOARD SECTION.
Already known symptom
Yes,I know.
Not yet.
Determine the symptom using the check list. Refer to 2.3.3.1. SIMPLE CHECK LIST.
See the table on the next page for the troubleshooting item.

CROSS REFERENCE:

2.3.3.1. SIMPLE CHECK LIST()
2.3.6. DIGITAL BOARD SECTION()
2.3.8. POWER SUPPLY BOARD SECTION()

2.3.3. TROUBLESHOOTING ITEMS TABLE

ITEM	SYMPTOM	REFERENCE
ADF (Auto Document Feeder)	The document does not feed. Document jam Multiple feed Skew	See **2.3.4. ADF (Auto document feed) SECTION**.
Recording paper feed	The recording paper does not feed. Paper jam Multiple feed and skew	See **2.3.4. ADF (Auto document feed) SECTION**.
Printing	The sent fax data is skewed. The received fax data is skewed. The received or copied data is expanded. A blank page is copied. A blank page is received. Black or white vertical line Black or white lateral line An abnormal image is printed.	See **2.3.4. ADF (Auto document feed) SECTION**.
Communication FAX, TEL (analog board)	Cannot communicate by fax. An error code is displayed.	See **2.3.5. COMMUNICATION SECTION**.
	Cannot talk. The DTMF tone doesn't work. The handset/monitor doesn't work, etc.	See **2.3.7. ANALOG BOARD SECTION**.
Operation panel	Keys are not accepted.	See **2.3.9. OPERATION PANEL SECTION**.
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	See **2.3.10. SENSOR SECTION**.

CROSS REFERENCE:

2.3.4. ADF (Auto Document Feed) SECTION()

2.3.5. COMMUNICATION SECTION()

2.3.7. ANALOG BOARD SECTION()

2.3.9. OPERATION PANEL SECTION()

2.3.10. SENSOR SECTION()

2.3.3.1. SIMPLE CHECK LIST

SERIAL NO. _____ DATE _____

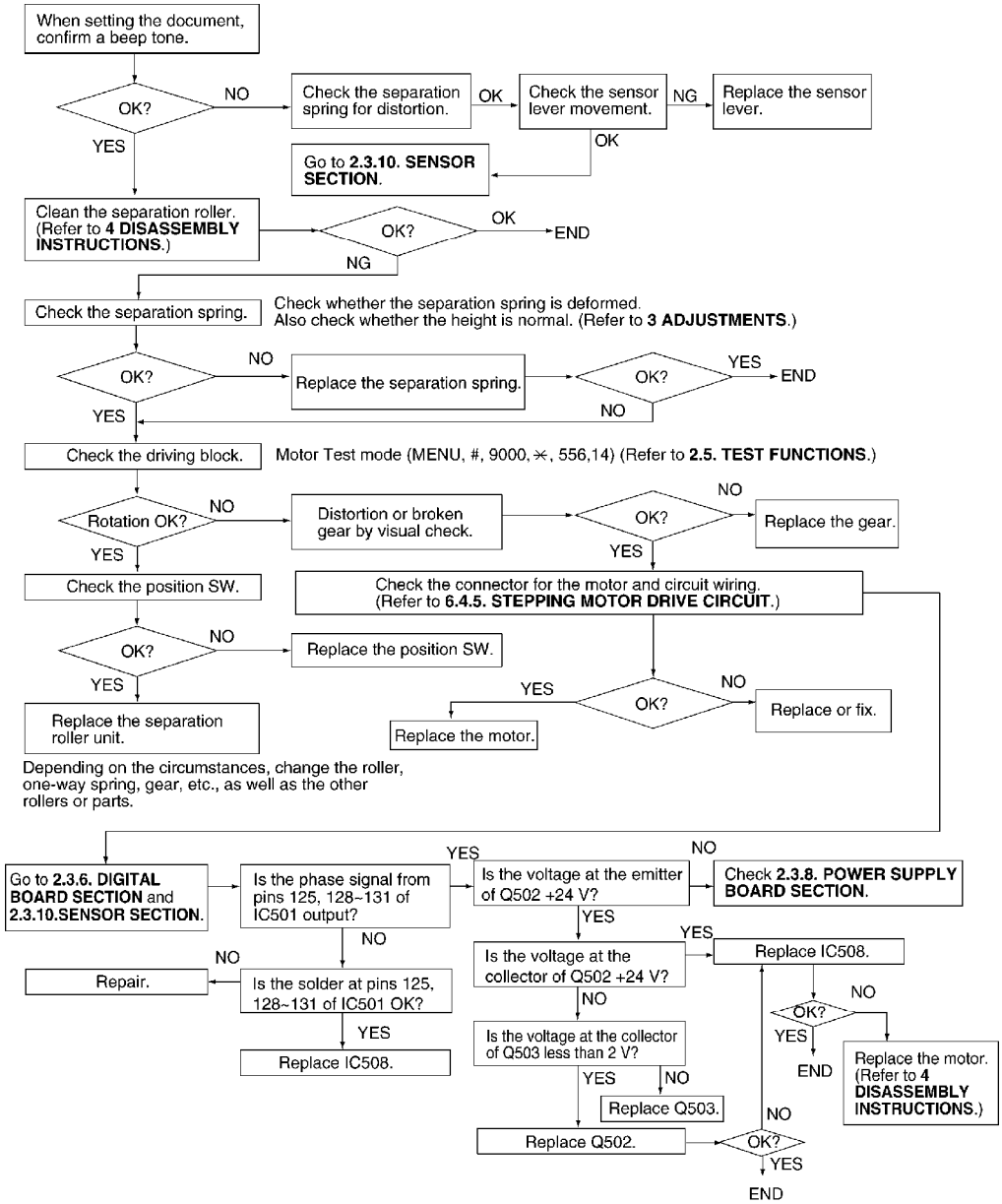
FUNCTION		JUDGEMENT	REFERENCE
FAX operaton	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telephone operation	Handset transceiver/ receiver	OK / NG	
	MONITOR sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	VOX detection	OK / NG	Service code 815※
Operation panel	Key check	OK / NG	Service code 561※
	LED check	OK / NG	Service code 557※
	LCD check	OK / NG	Service code 558※
Sensor	Sensor check	OK / NG	Service code 815※
Clock		OK / NG	Is the time kept correctly? Check with another clock.
EXT-TAM	Handset transceiver/receiver	OK / NG	
	Remote control	OK / NG	

※Check according to the service code referring to **2.5. TEST FUNCTIONS**.

CROSS REFERENCE:
2.5. TEST FUNCTIONS()

2.3.4. ADF (Auto Document Feed) SECTION

2.3.4.1. NO DOCUMENT FEED



CROSS REFERENCE:

2.3.6. DIGITAL BOARD SECTION()
2.3.8. POWER SUPPLY BOARD SECTION()
2.3.10. SENSOR SECTION()
2.5. TEST FUNCTIONS()
3 ADJUSTMENTS()
4 DISASSEMBLY INSTRUCTIONS()
6.4.5. STEPPING MOTOR DRIVE CIRCUIT()

Note:

When using thin paper etc., sometimes the document will not feed. Refer to 3.1. ADJUSTING THE FEEDER PRESSURE().

2.3.4.2. MULTIPLE FEED

- When using thick paper etc., sometimes the document will not be fed.

Refer to 3.1. ADJUSTING THE FEEDER PRESSURE().

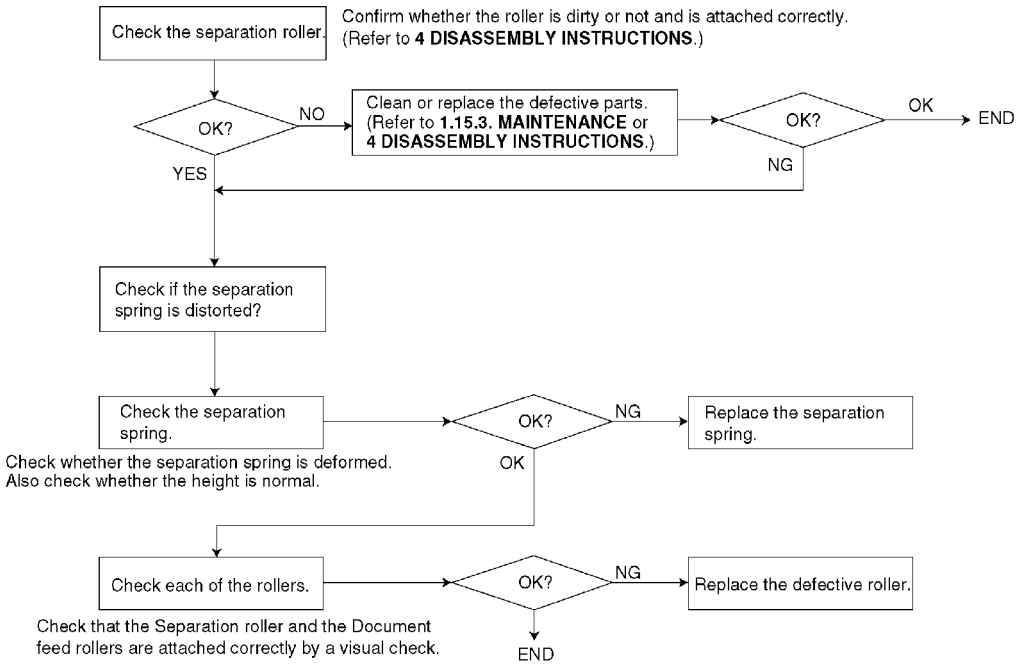
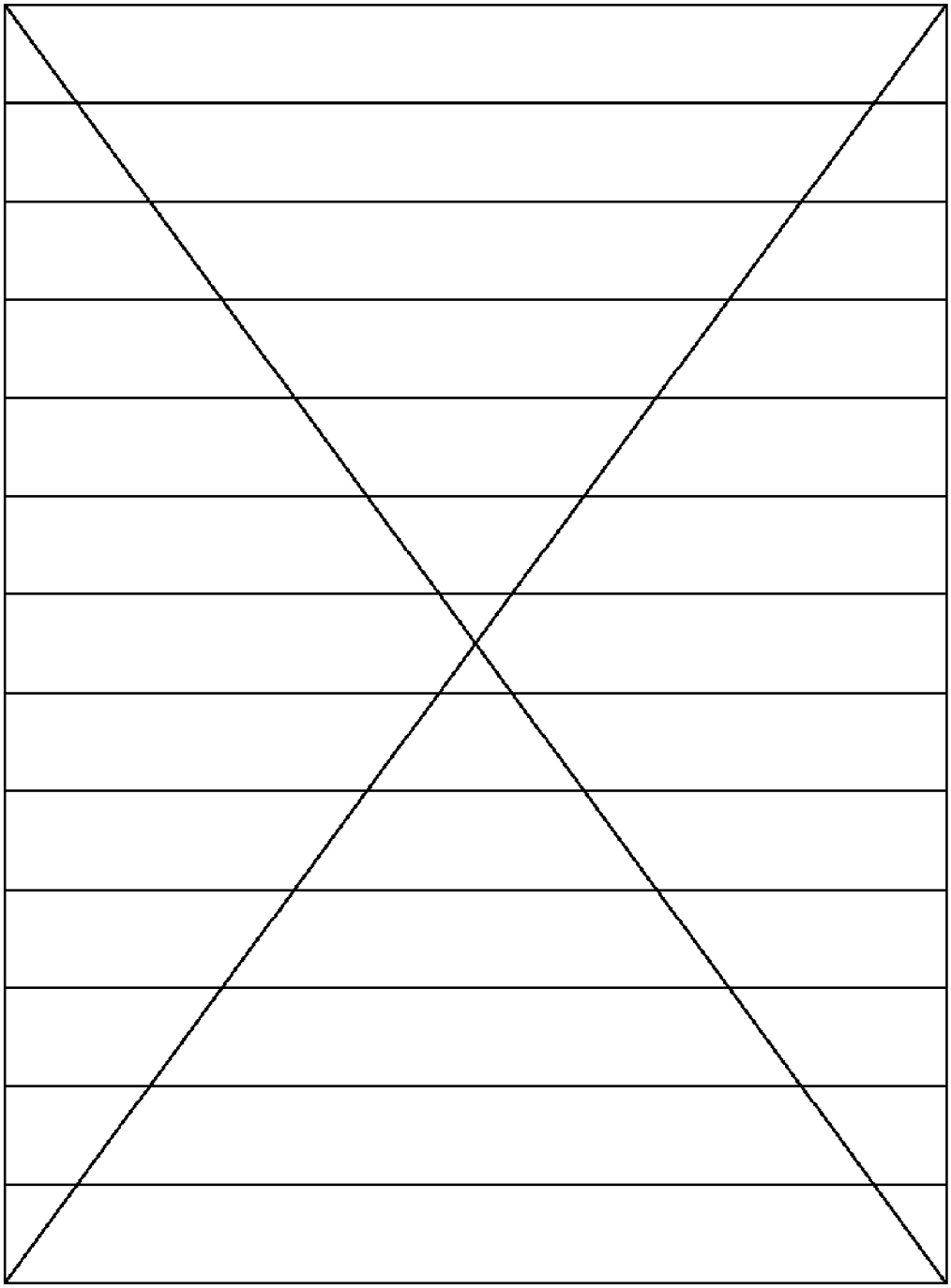


Fig. B



CROSS REFERENCE:

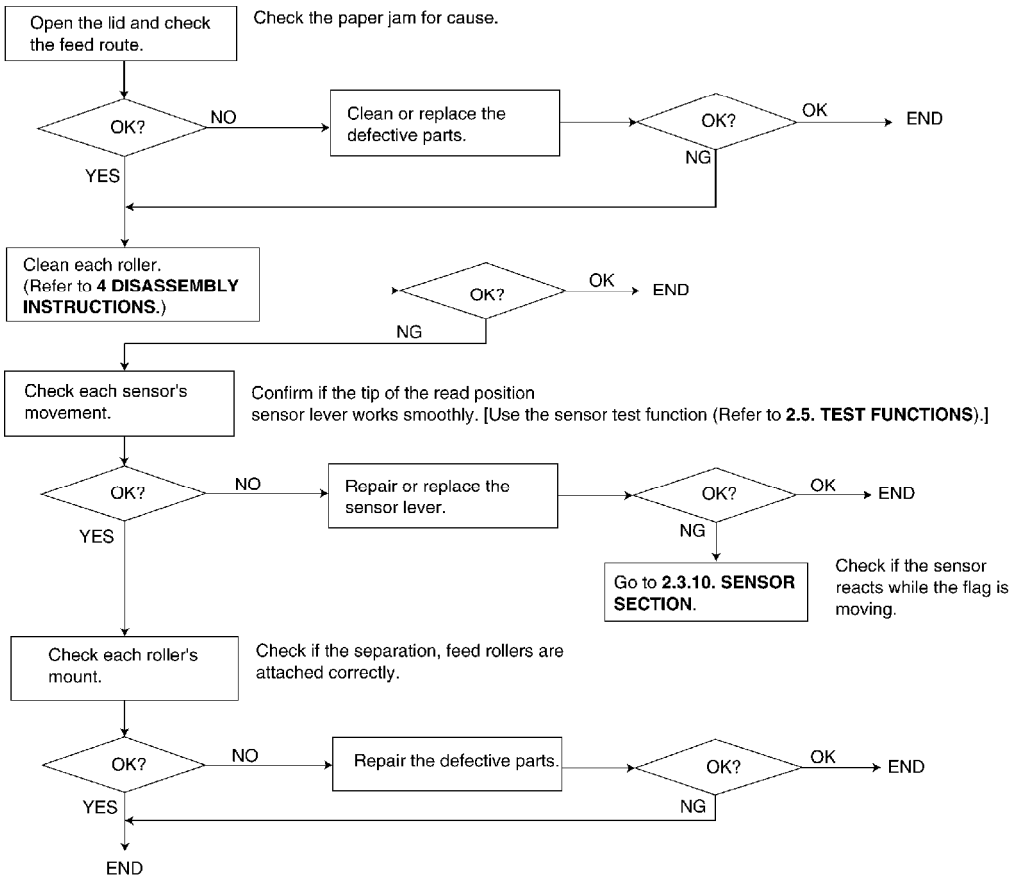
1.15.3. MAINTENANCE()
3 ADJUSTMENTS()
4 DISASSEMBLY INSTRUCTIONS()

Note:

When confirming if the characters are extended or distorted, or if the feed problem is occurred, use this test chart format

(Fig. B).

2.3.4.3. DOCUMENT JAM

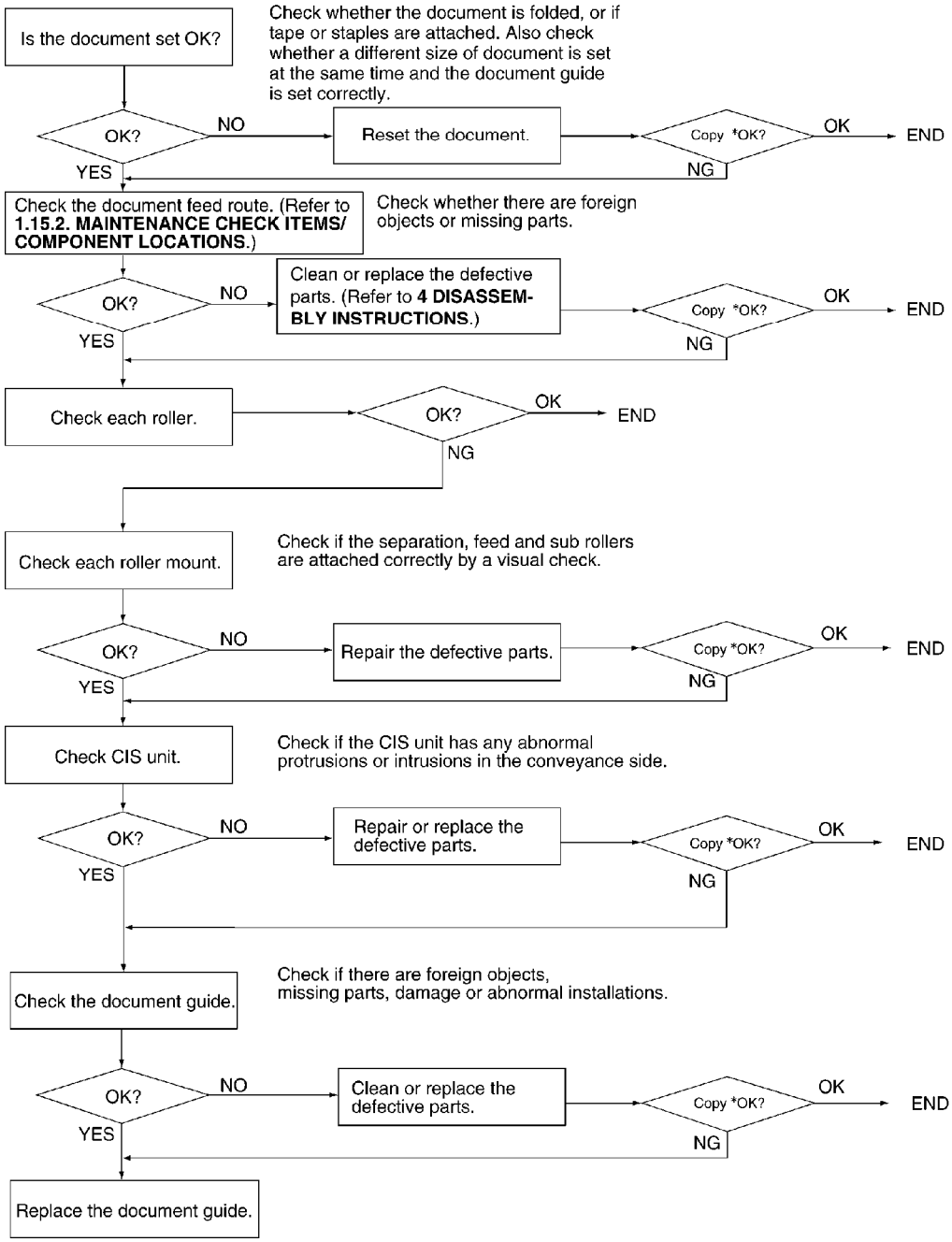


CROSS REFERENCE:

2.3.10. SENSOR SECTION()

4 DISASSEMBLY INSTRUCTIONS()

2.3.4.4. SKEW



*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED () and using it.**

CROSS REFERENCE:

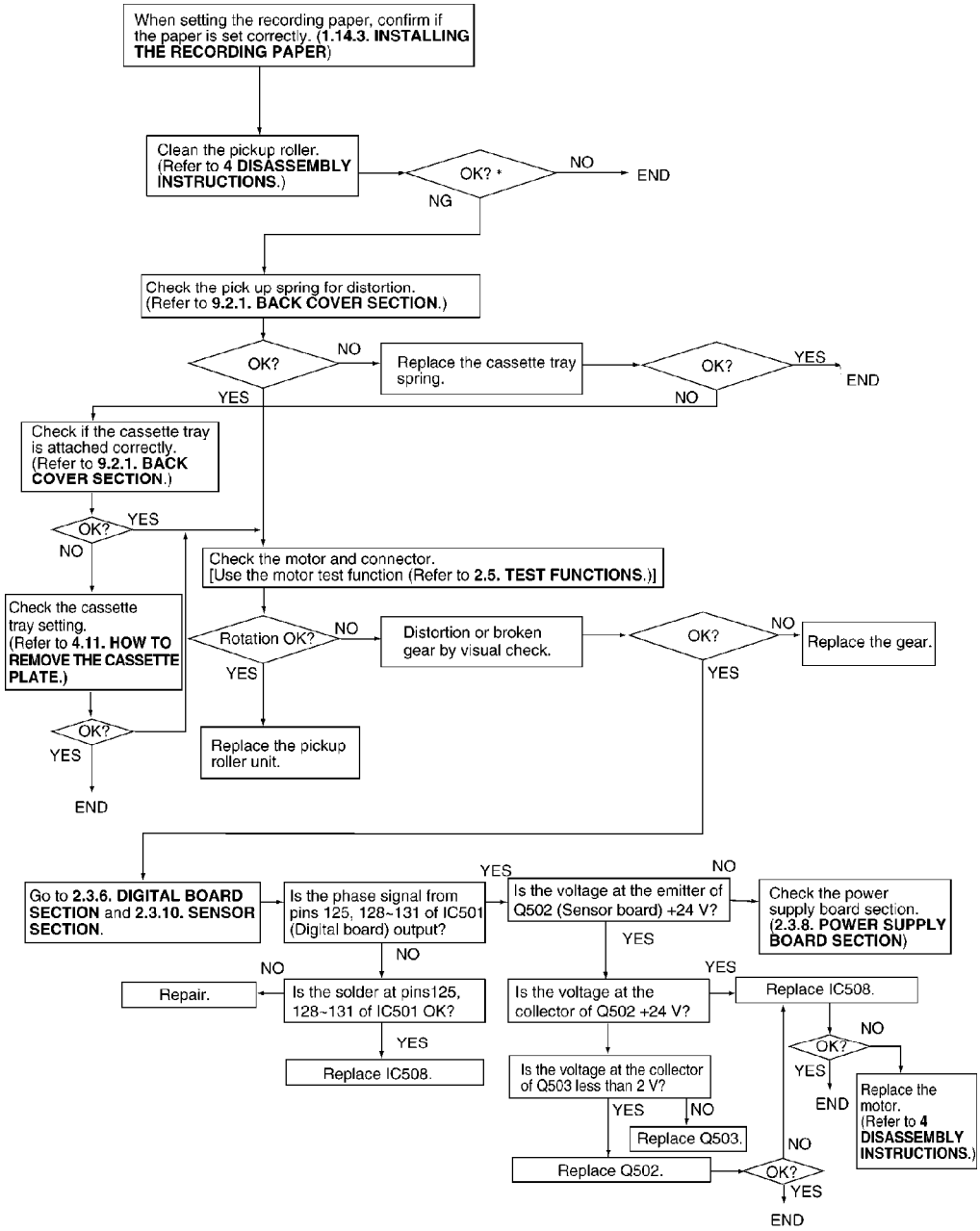
1.15.2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS()

2.3.4. ADF (Auto Document Feed) SECTION()

2.3.4.2. MULTIPLE FEED()

4 DISASSEMBLY INSTRUCTIONS()

2.3.4.5. THE RECORDING PAPER DOES NOT FEED

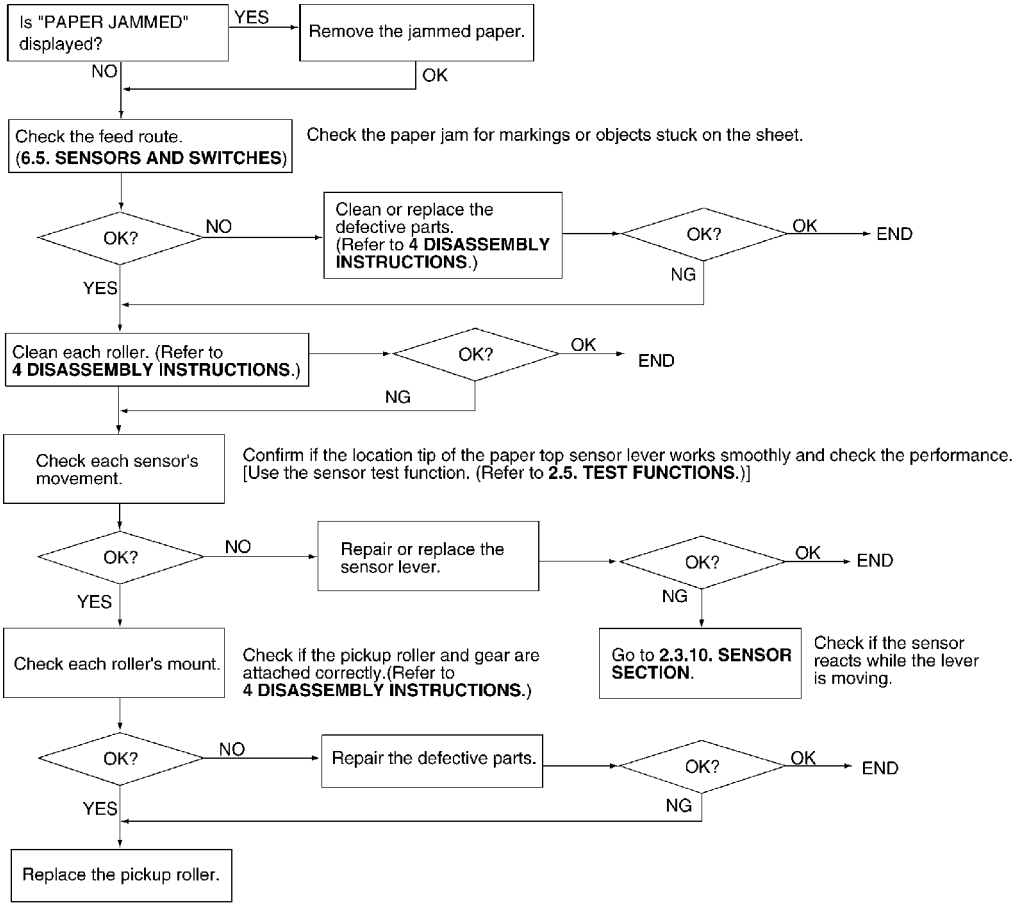


*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED ()and using it.**

CROSS REFERENCE:

1.14.3. INSTALLING THE RECORDING PAPER()
2.3.6. DIGITAL BOARD SECTION()
2.3.8. POWER SUPPLY BOARD SECTION()
2.3.10. SENSOR SECTION()
2.5. TEST FUNCTIONS()
4 DISASSEMBLY INSTRUCTIONS()
4.11. HOW TO REMOVE THE CASSETTE PLATE()
9.2.1. BACK COVER SECTION()

2.3.4.6. PAPER JAM



CROSS REFERENCE:

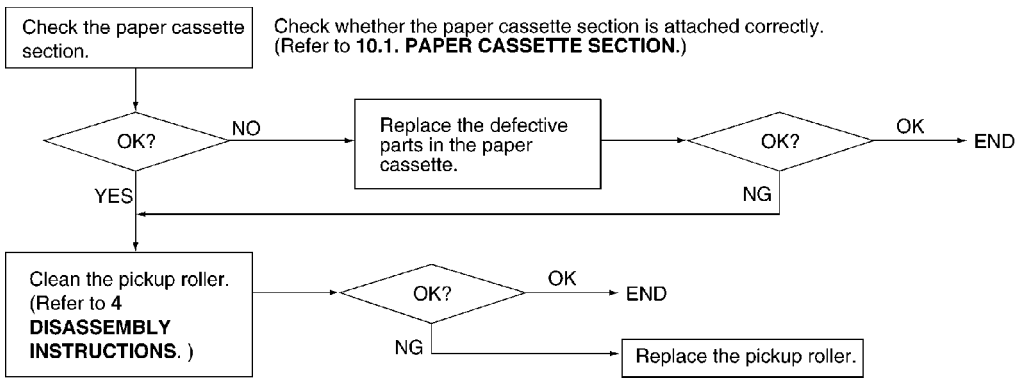
2.3.10. SENSOR SECTION()

2.5. TEST FUNCTIONS()

4 DISASSEMBLY INSTRUCTIONS()

6.5. SENSORS AND SWITCHES()

2.3.4.7. MULTIPLE FEED AND SKEW

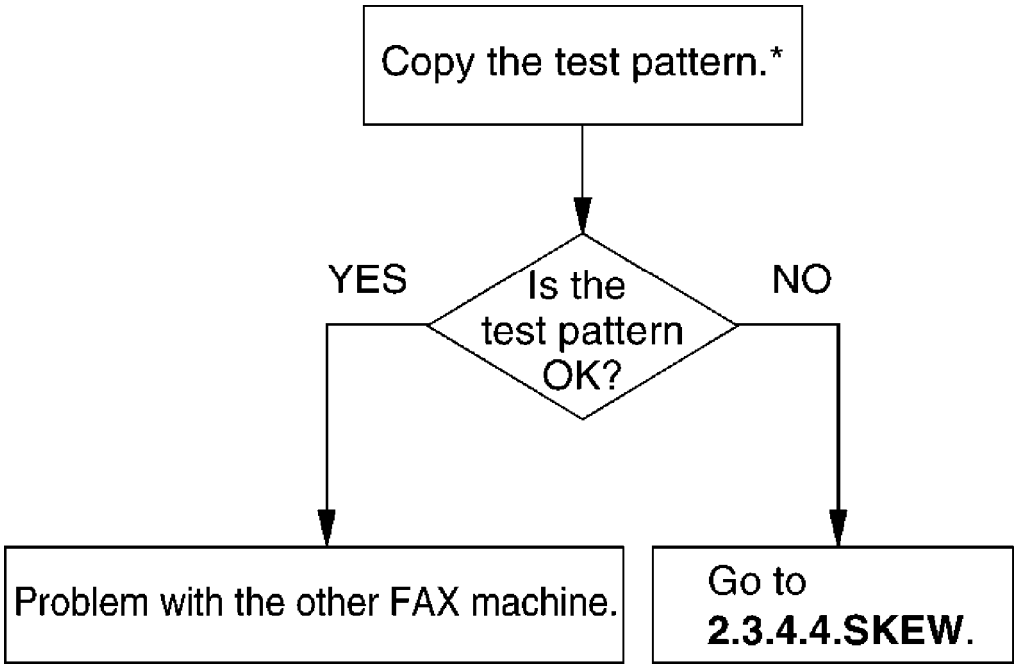


CROSS REFERENCE:

4 DISASSEMBLY INSTRUCTIONS()

9.1. OPERATION PANEL SECTION()

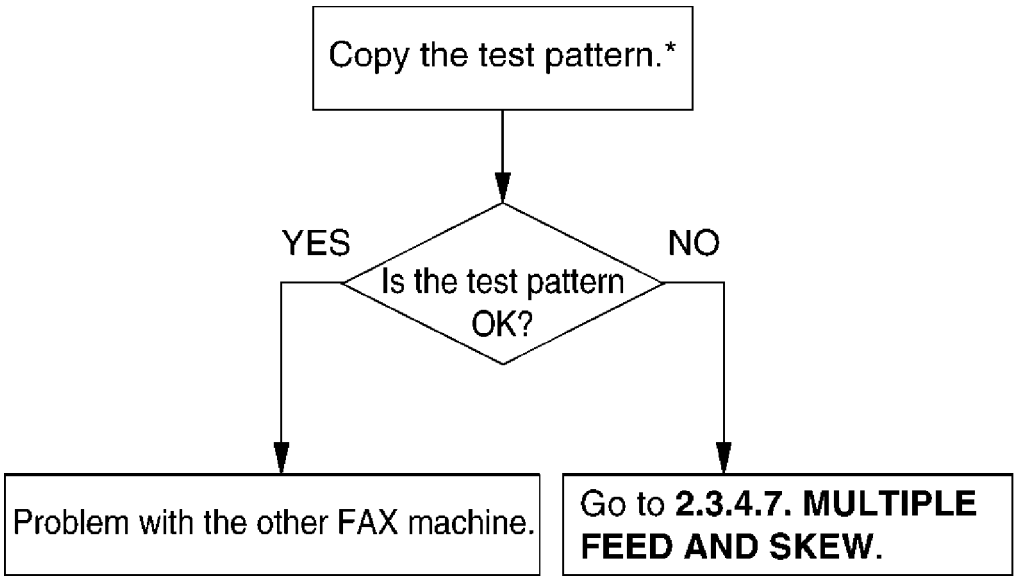
2.3.4.8. THE SENT FAX DATA IS SKEWED



*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED() and using it.**

CROSS REFERENCE:
2.3.4.4. SKEW()

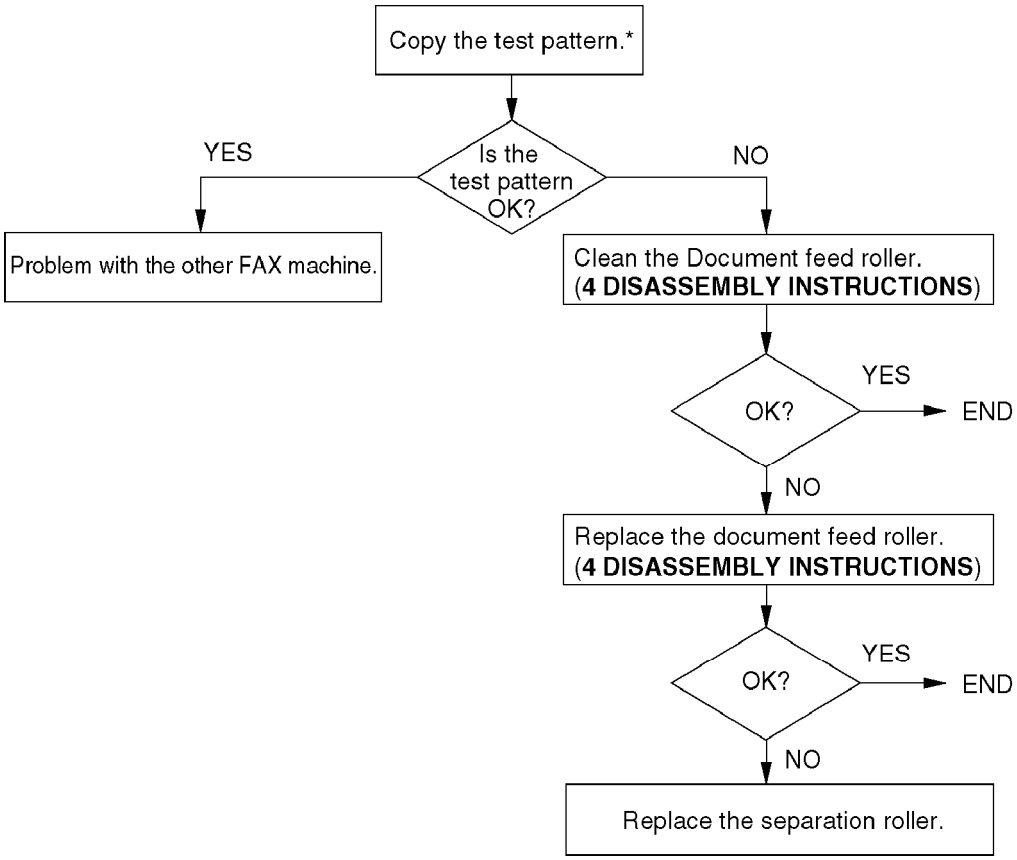
2.3.4.9. THE RECEIVED FAX DATA IS SKEWED



*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED() and using it.**

CROSS REFERENCE:
2.3.4.7. MULTIPLE FEED AND SKEW()

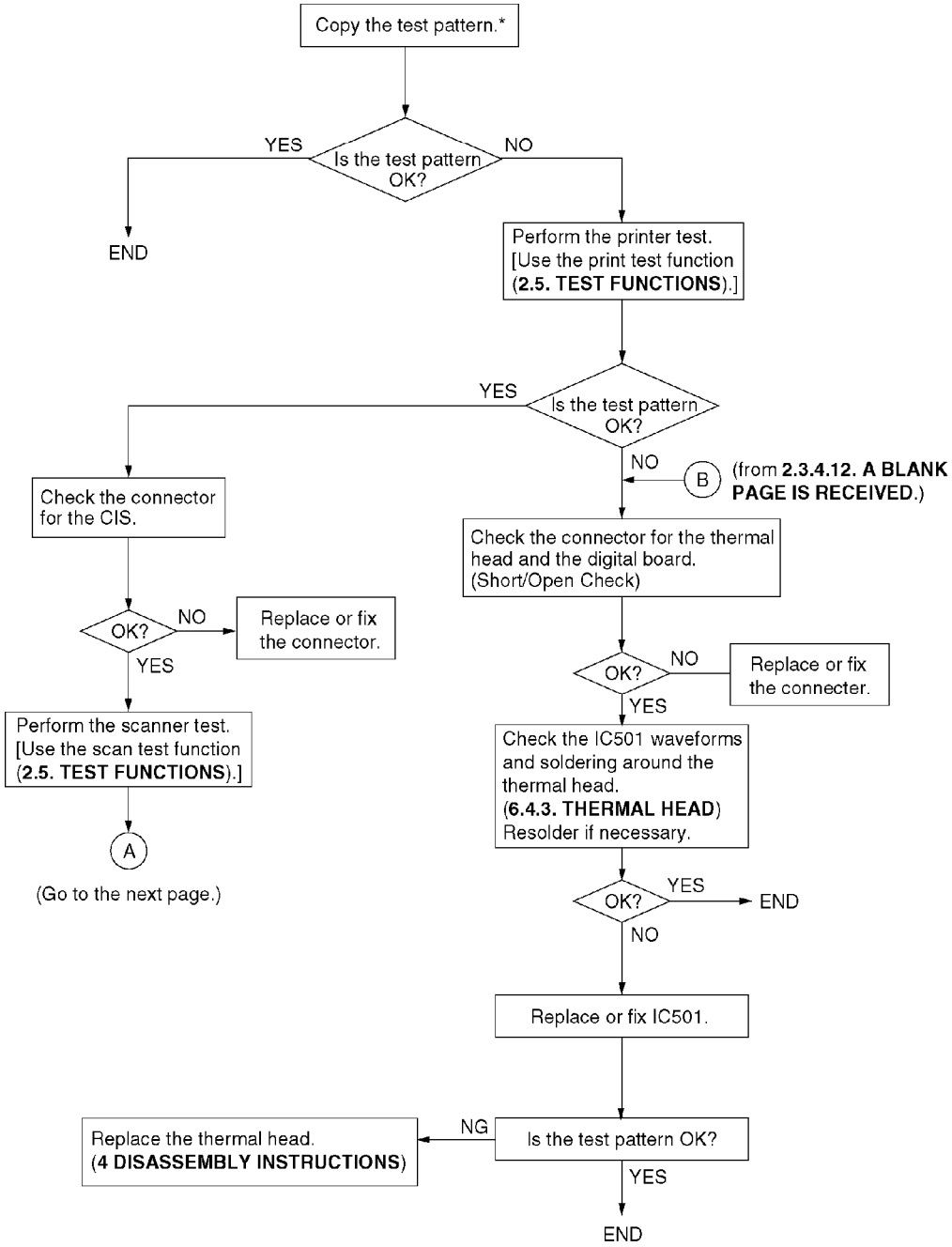
2.3.4.10. RECEIVED OR COPIED DATA IS EXPANDED



*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED() and using it.**

CROSS REFERENCE:
4 DISASSEMBLY INSTRUCTIONS()

2.3.4.11. A BLANK PAGE IS COPIED



*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED () and using it.**

CROSS REFERENCE:

2.3.4.2. MULTIPLE FEED()
2.3.4.12. ABLANK PAGE IS RECEIVED()
2.5. TEST FUNCTIONS()
4 DISASSEMBLY INSTRUCTIONS()
6.4.3. THERMAL HEAD()

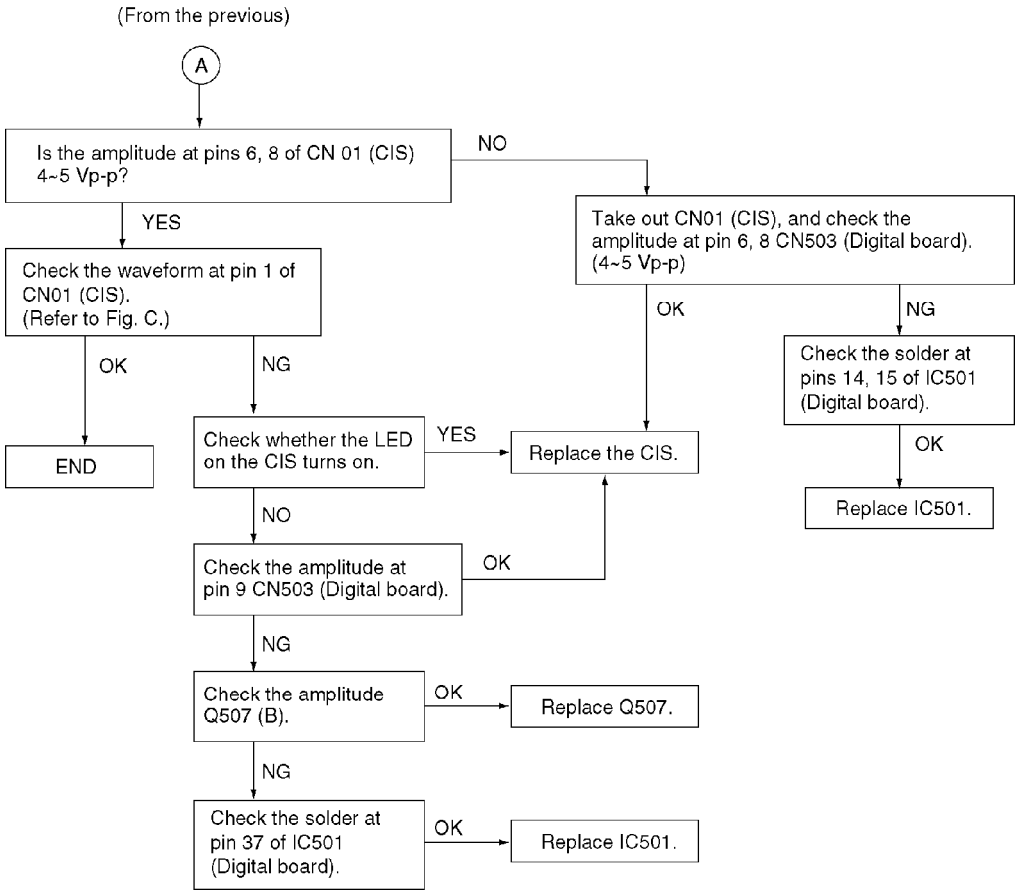
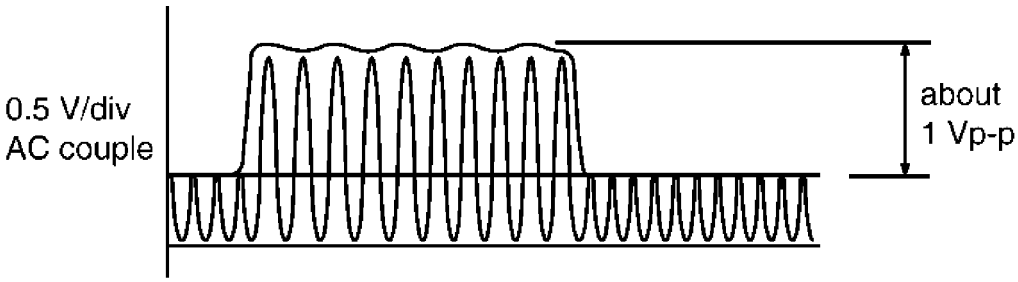
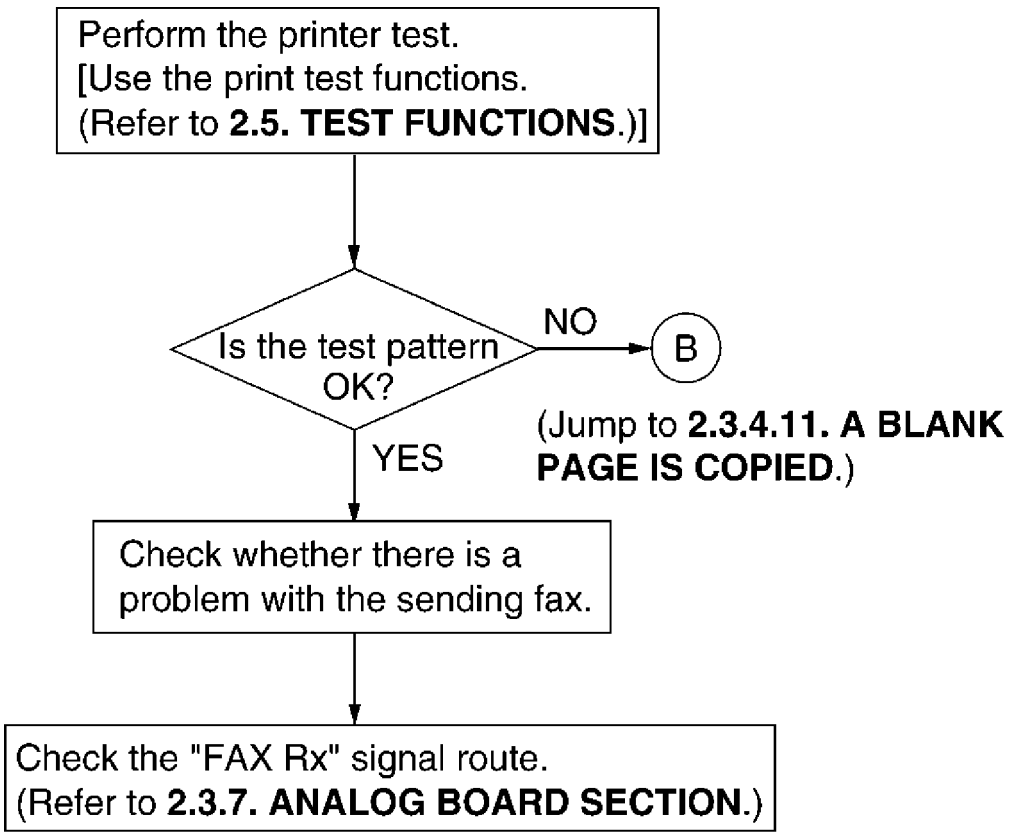

(From the previous)
A
Is the amplitude at pins 6, 8 of CN 01 (CIS) 4~5 Vp-p?
NO
YES
Take out CN01 (CIS), and check the amplitude at pin 6, 8 CN503 (Digital board). (4~5 Vp-p)
Check the waveform at pin 1 of CN01 (CIS). (Refer to Fig. C.)
OK
NG
NG
Check the solder at pins 14, 15 of IC501 (Digital board).
OK
END
Check whether the LED on the CIS turns on.
YES
Replace the CIS.
Replace IC501.
NO
Check the amplitude at pin 9 CN503 (Digital board).
OK
NG
Check the amplitude Q507 (B).
OK
Replace Q507.
NG
Check the solder at pin 37 of IC501 (Digital board).
OK
Replace IC501.

Fig. C



2.3.4.12. ABLANK PAGE IS RECEIVED


Perform the printer test.
[Use the print test functions.
(Refer to 2.5. TEST FUNCTIONS.)]
Is the test pattern OK?
NO
B
(Jump to 2.3.4.11. A BLANK PAGE IS COPIED.)
YES
Check whether there is a problem with the sending fax.
Check the "FAX Rx" signal route.
(Refer to 2.3.7. ANALOG BOARD SECTION.)

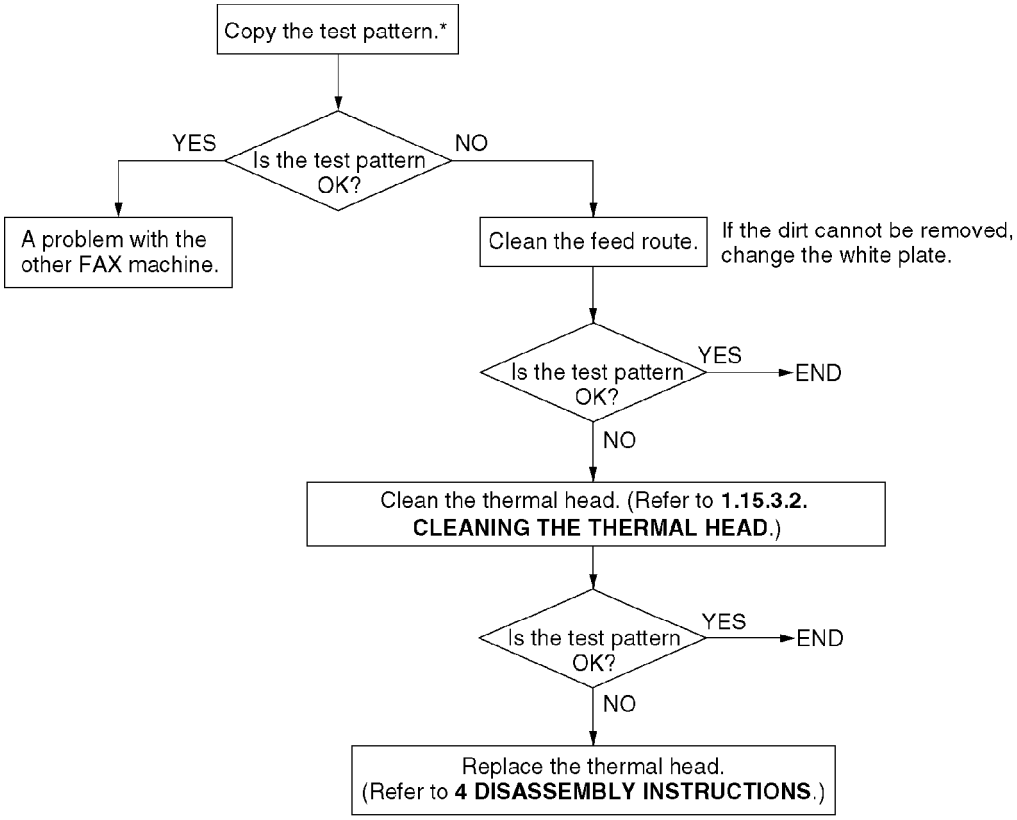
CROSS REFERENCE:

2.3.4.11. A BLANK PAGE IS COPIED()

2.3.7. ANALOG BOARD SECTION()

2.5. TEST FUNCTIONS()

2.3.4.13. BLACK OR WHITE VERTICAL LINE


Copy the test pattern.*
Is the test pattern OK?
YES
NO
A problem with the other FAX machine.
Clean the feed route.
If the dirt cannot be removed, change the white plate.
Is the test pattern OK?
YES
END
NO
Clean the thermal head. (Refer to 1.15.3.2. CLEANING THE THERMAL HEAD.)
Is the test pattern OK?
YES
END
NO
Replace the thermal head. (Refer to 4 DISASSEMBLY INSTRUCTIONS.)

*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED () and using it.**

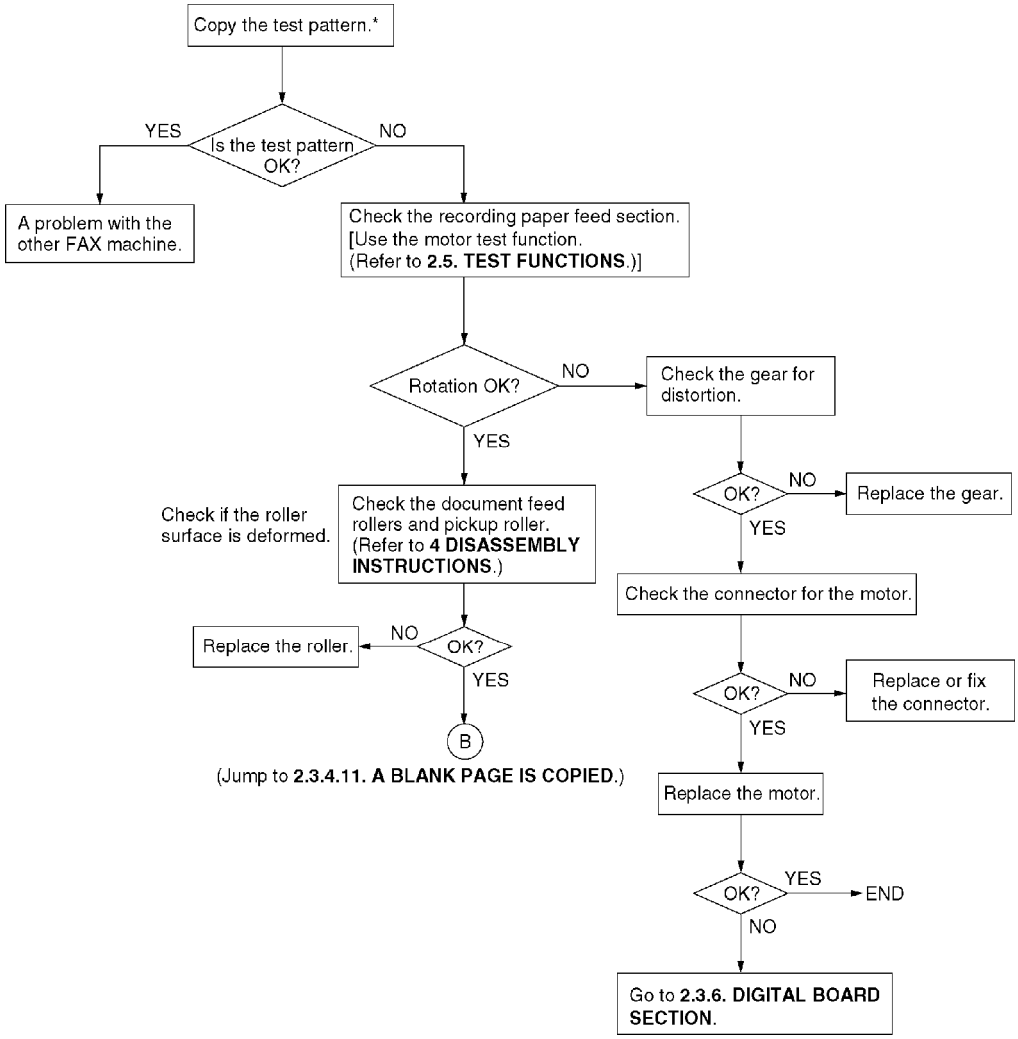
CROSS REFERENCE:

1.15.3.2. CLEANING THE THERMAL HEAD AND BLACK BAR()

2.3.4.2. MULTIPLE FEED()

4 DISASSEMBLY INSTRUCTIONS()

2.3.4.14. BLACK OR WHITE LATERAL LINE ON PRINT OUT

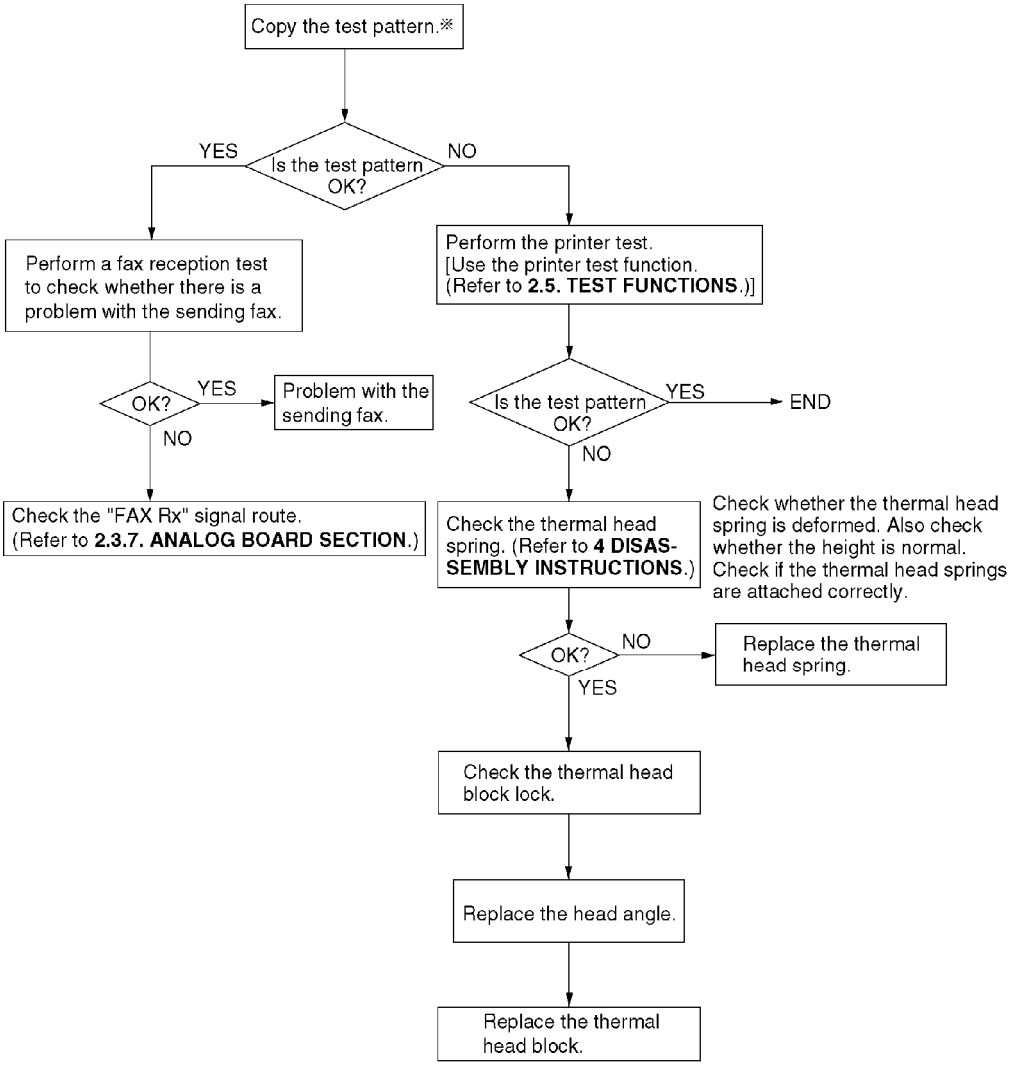


*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED() and using it.**

CROSS REFERENCE:

2.3.4.2. MULTIPLE FEED()
2.3.4.11. A BLANK PAGE IS COPIED()
2.3.6. DIGITAL BOARD SECTION()
2.5. TEST FUNCTIONS()
4 DISASSEMBLY INSTRUCTIONS()

2.3.4.15. AN ABNORMAL IMAGE IS PRINTED


Copy the test pattern.※
Is the test pattern OK?
YES
NO
Perform a fax reception test to check whether there is a problem with the sending fax.
Perform the printer test. [Use the printer test function. (Refer to 2.5. TEST FUNCTIONS.)]
OK?
YES
Problem with the sending fax.
NO
Is the test pattern OK?
YES
END
NO
Check the "FAX Rx" signal route. (Refer to 2.3.7. ANALOG BOARD SECTION.)
Check the thermal head spring. (Refer to 4 DISASSEMBLY INSTRUCTIONS.)
Check whether the thermal head spring is deformed. Also check whether the height is normal. Check if the thermal head springs are attached correctly.
OK?
NO
Replace the thermal head spring.
YES
Check the thermal head block lock.
Replace the head angle.
Replace the thermal head block.

*** We recommend making a copy of the Fig. B document in 2.3.4.2. MULTIPLE FEED () and using it.**

CROSS REFERENCE:
2.3.4.2. MULTIPLE FEED()
2.3.7. ANALOG BOARD SECTION()
2.5. TEST FUNCTIONS()
4 DISASSEMBLY INSTRUCTIONS()

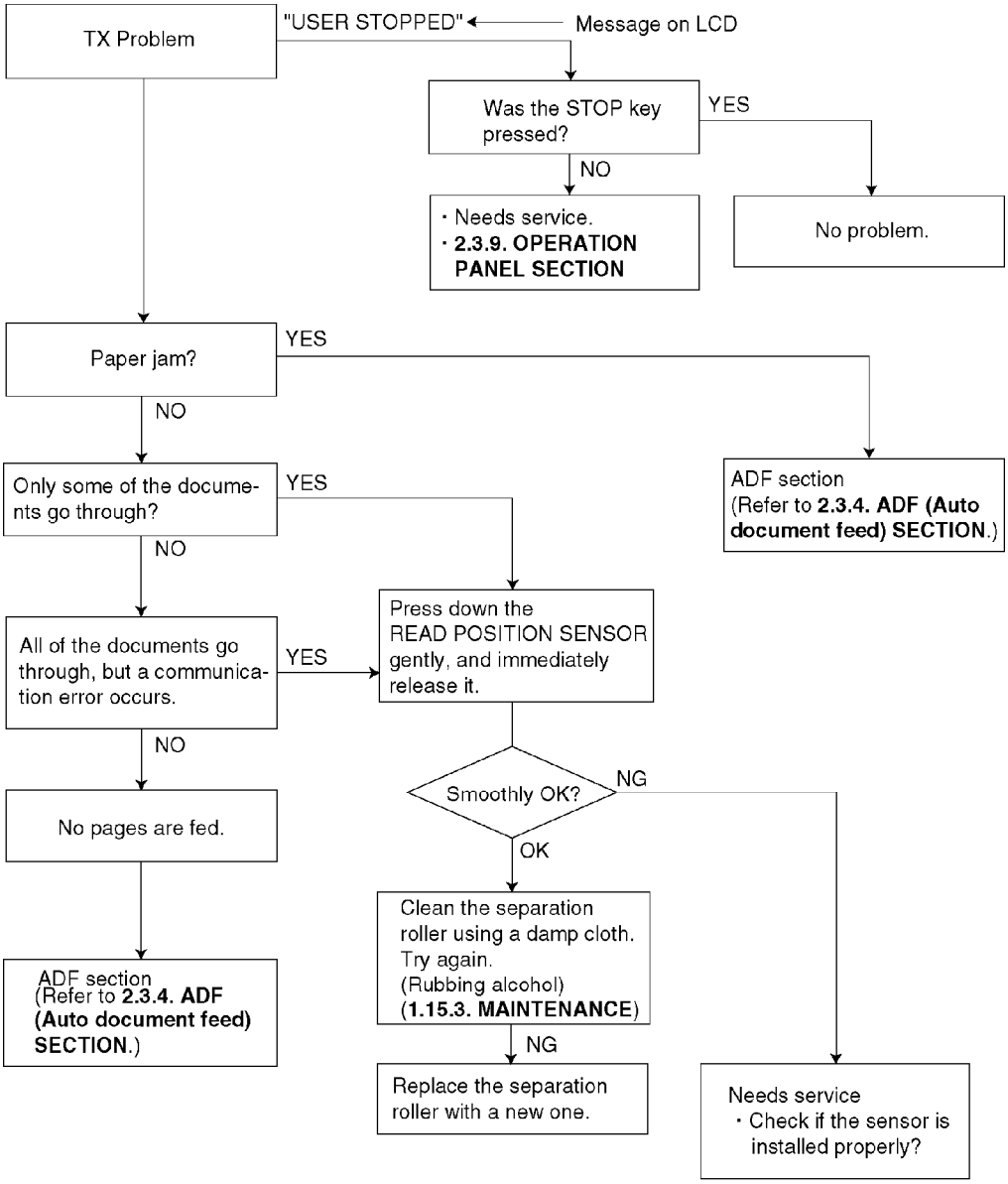
2.3.5. COMMUNICATION SECTION

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in 2.3.5.1. DEFECTIVE FACSIMILE SECTION .

No.	Symptom	Content	Possible cause
1	The paper is not fed properly when faxing. (Nor in the copy mode.)	Troubleshooting	Problem with the feeding mechanism.
2	The fax usually transmits successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the receiver's fax.
3	The fax usually receives successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the transmitter's fax.
4	The fax completely fails to transmit or receive. (The unit can copy documents.)	Troubleshooting	Problem with the electric circuit.
5	The fax fails either to transmit or receive when making a long distance or an international call. (The unit can copy documents.)	Detailed description of the possible causes (Similar to troubleshooting items No.2 and No.3.)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or an international call.		
7	No.1-No.5	The troubleshooting procedure for each error code will be printed on the communication result report.	

2.3.5.1. DEFECTIVE FACSIMILE SECTION

2.3.5.1.1. TRANSMIT PROBLEM



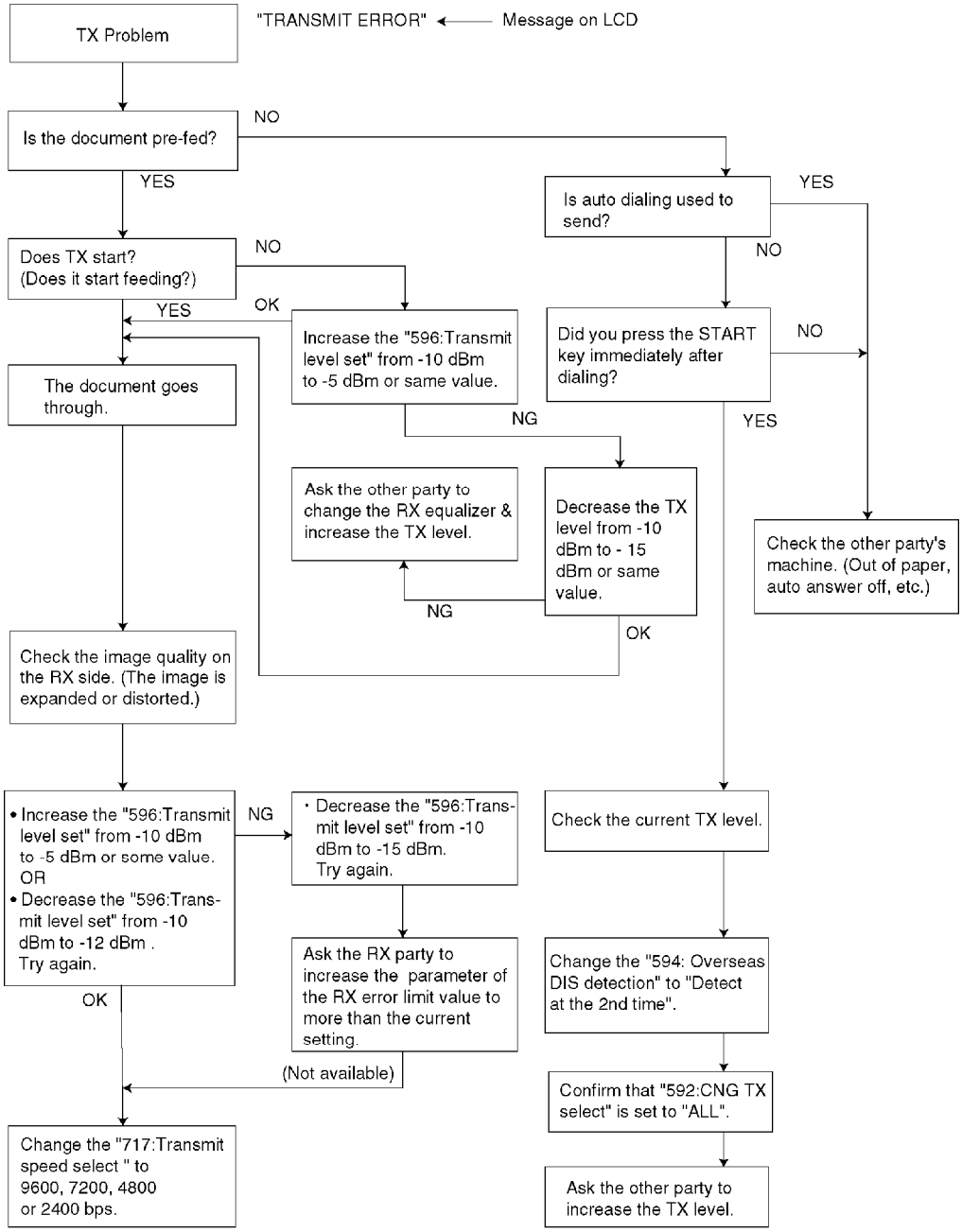
CROSS REFERENCE:

1.15.3. MAINTENANCE()

2.3.4. ADF (Auto Document Feed) SECTION()

2.3.9. OPERATION PANEL SECTION()

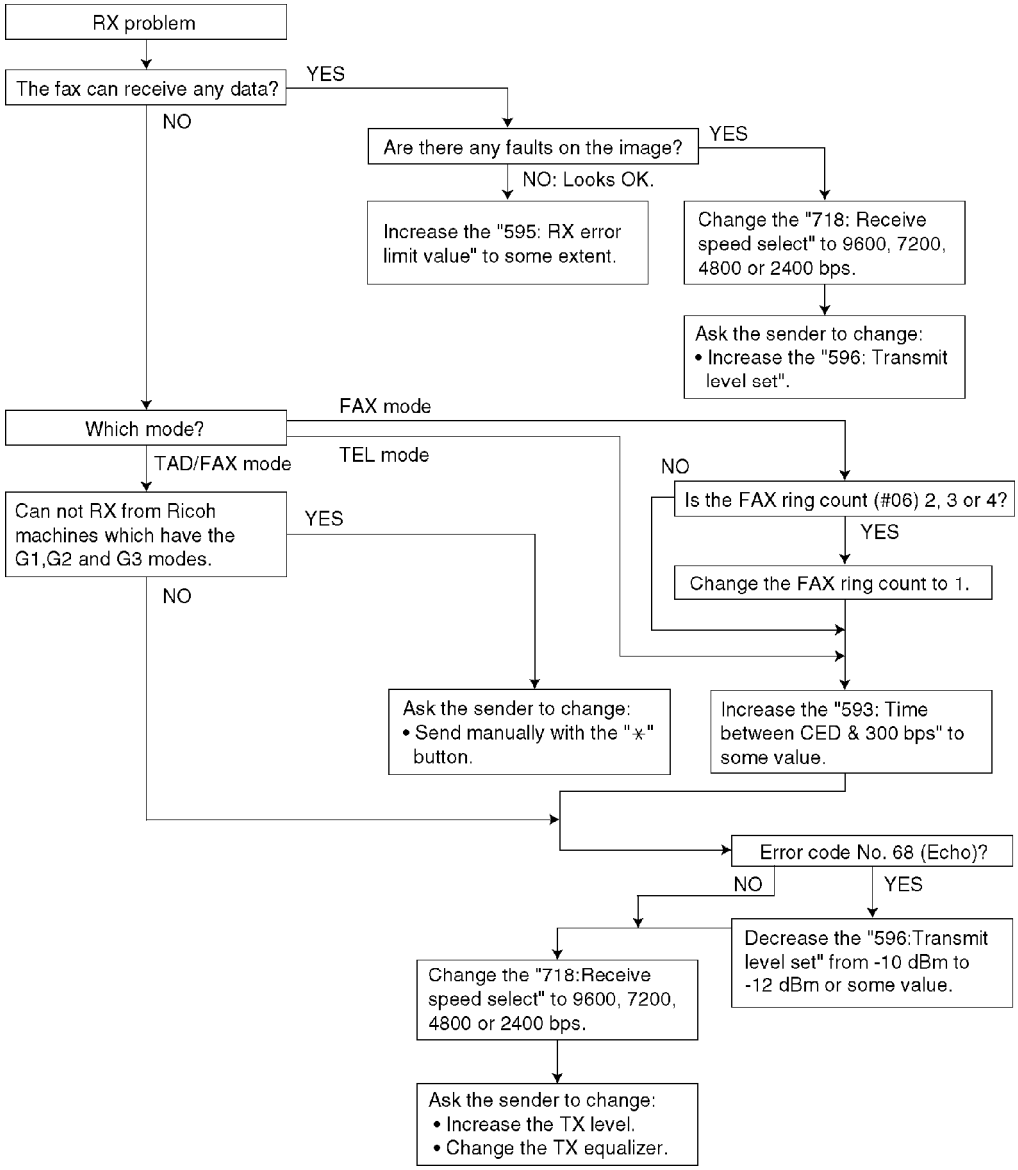
2.3.5.1.2. SOMETIME THERE IS A TRANSMIT PROBLEM


TX Problem
"TRANSMIT ERROR"
Message on LCD
Is the document pre-fed?
NO
YES
Is auto dialing used to send?
YES
NO
Does TX start? (Does it start feeding?)
NO
YES
OK
Increase the "596:Transmit level set" from -10 dBm to -5 dBm or same value.
Did you press the START key immediately after dialing?
NO
The document goes through.
NG
YES
Ask the other party to change the RX equalizer & increase the TX level.
Decrease the TX level from -10 dBm to - 15 dBm or same value.
Check the other party's machine. (Out of paper, auto answer off, etc.)
NG
OK
Check the image quality on the RX side. (The image is expanded or distorted.)
• Increase the "596:Transmit level set" from -10 dBm to -5 dBm or some value. OR • Decrease the "596:Transmit level set" from -10 dBm to -12 dBm . Try again.
NG
• Decrease the "596:Transmit level set" from -10 dBm to -15 dBm. Try again.
Check the current TX level.
OK
Ask the RX party to increase the parameter of the RX error limit value to more than the current setting.
Change the "594: Overseas DIS detection" to "Detect at the 2nd time".
(Not available)
Confirm that "592:CNG TX select" is set to "ALL".
Change the "717:Transmit speed select " to 9600, 7200, 4800 or 2400 bps.
Ask the other party to increase the TX level.

Note:
"596: Transmit level set" represents a service code. (Refer to 2.4.4. SERVICE FUNCTION TABLE ().)

2.3.5.1.3. RECEIVE PROBLEM

First confirm whether the recording paper is installed properly or not before starting troubleshooting. (Refer to "Remarks".)

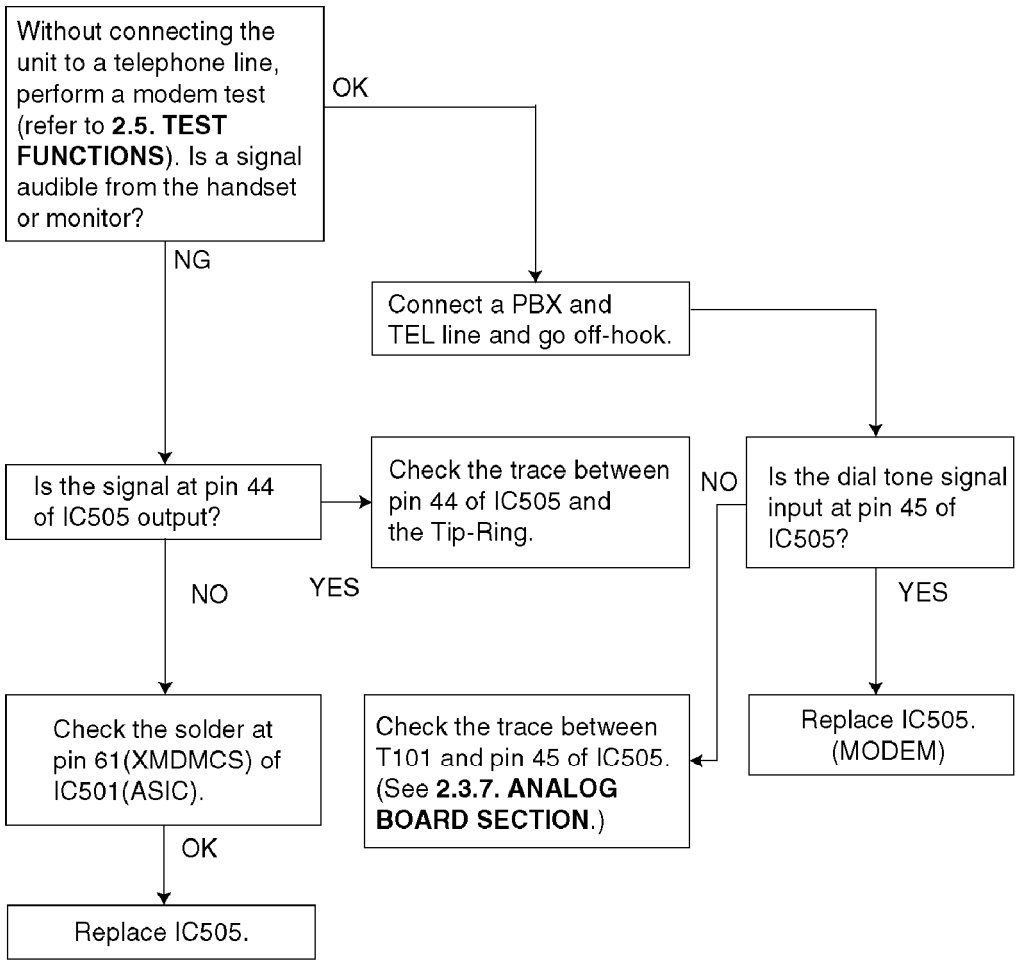

RX problem
The fax can receive any data?
YES
NO
Are there any faults on the image?
YES
NO: Looks OK.
Increase the "595: RX error limit value" to some extent.
Change the "718: Receive speed select" to 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the "596: Transmit level set".
Which mode?
FAX mode
TEL mode
TAD/FAX mode
NO
Is the FAX ring count (#06) 2, 3 or 4?
YES
Change the FAX ring count to 1.
Can not RX from Ricoh machines which have the G1,G2 and G3 modes.
YES
NO
Ask the sender to change:
• Send manually with the "*" button.
Increase the "593: Time between CED & 300 bps" to some value.
Error code No. 68 (Echo)?
NO
YES
Decrease the "596:Transmit level set" from -10 dBm to -12 dBm or some value.
Change the "718:Receive speed select" to 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the TX level.
• Change the TX equalizer.

Note:
"596: Transmit level set" represents a service code. (Refer to 2.4.4. SERVICE FUNCTION TABLE ().)

Remarks:
Regarding the reception problem, we have investigated the conceivable causes in the flow chart except for the software-related errors. However, some troubles may occur due to the software-related problems such as "OUT OF PAPER" when the fax switches to the memory receiving mode and the memory capacity becomes full of the unprintable data. In this case, error messages [MEMORY FULL] and its main cause, for example "CHECK PAPER" are displayed on the LCD. Once you solve the main problem, [MEMORY FULL] will be cancelled and the reception problem will be resolved.
LCD display messages indicating the error causes are shown below.
CHECK PAPER
COVER OPEN

UNIT OVERHEATED (COVER OPEN, etc.)...Reset the unit.
PAPER JAMMED
CHECK FILM
Please refer to 2.2. USER RECOVERABLE ERRORS () for the above items. If it turns out to be a hardware deformity, please check each sensor. (Refer to 2.5. TEST FUNCTIONS ().)

2.3.5.1.4. THE UNIT CAN COPY, BUT CANNOT TRANSMIT/RECEIVE

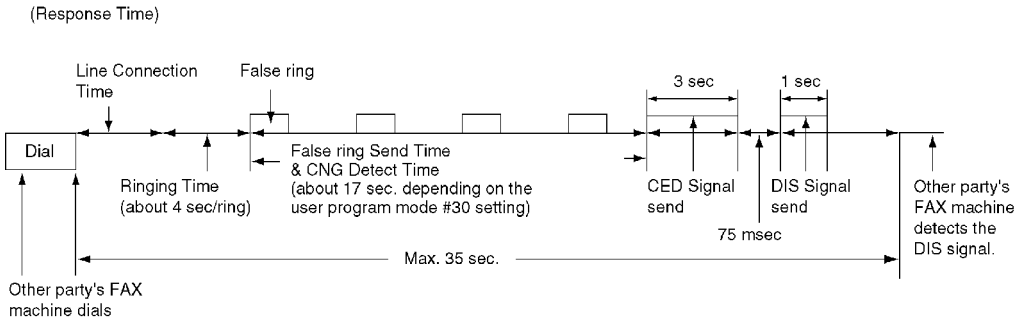

Without connecting the unit to a telephone line, perform a modem test (refer to 2.5. TEST FUNCTIONS). Is a signal audible from the handset or monitor?
OK
NG
Connect a PBX and TEL line and go off-hook.
Is the signal at pin 44 of IC505 output?
Check the trace between pin 44 of IC505 and the Tip-Ring.
NO
YES
Is the dial tone signal input at pin 45 of IC505?
NO
YES
Check the solder at pin 61(XMDMCS) of IC501(ASIC).
Check the trace between T101 and pin 45 of IC505. (See 2.3.7. ANALOG BOARD SECTION.)
Replace IC505. (MODEM)
OK
Replace IC505.

CROSS REFERENCE:
2.3.7. ANALOG BOARD SECTION()
2.5. TEST FUNCTIONS()

2.3.5.1.5. THE UNIT CAN COPY, BUT CANNOT EITHER TRANSMIT/RECEIVE LONG DISTANCE OR INTERNATIONL COMMUNICATIONS

The following two causes can be considered for this symptom.

Cause 1:
The other party is executing automatic dialing, the call has been received by this unit, and the CED or DIS signal response time is too long. (In most cases, this unit detects the CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication procedure is cancelled when there is no response from the other party within 35 sec, so that the other party releases the line.)



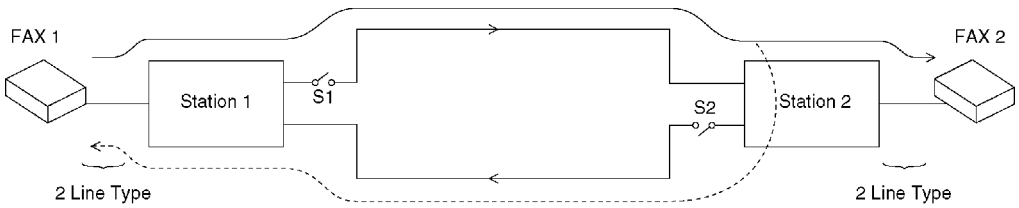
(Cause and Countermeasure)

As shown in the chart above, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time cannot be reduced. Accordingly, the following countermeasures should be tried.

(A)... As the 35 sec. count is started directly after dialing or directly after the START button has been pressed for models with a START button, the other party should be called manually, if possible. Another possibility is entering two pauses at the end of the auto dial number on the transmission side. Then the count start time can be delayed for 2 pauses (about 10 sec.).

Cause 2:

Erroneous detection because of an echo or an echo canceler.



(Echo/Echo Canceler)

The signal from FAX1 reaches FAX2 via stations 1 and 2, but the reflection signal at station 2 also returns via station 1 (echo). As the distance between station 1 and station 2 is far, the echo returns to FAX 1 at a max of 600 msec after transmission. There is a possibility that this signal is detected erroneously as the signal from FAX2. For a normal call, there is also a possibility that the echo of their own voice will make the call difficult to understand. For this reason, each station (station 1 and station 2) attaches echo cancelers (S1 and S2) for international lines or long distance lines. For the echo canceler, the level of the transmission signal from FAX 1 is compared with the level of the reception signal from FAX2. When the transmission signal is larger, S1 is closed while S2 is opened when it is smaller. In other words, for transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Causes and Countermeasures)

(Cause A)

When a training signal is transmitted from FAX1 during the communication procedure at the time of transmission from FAX1 to FAX2, there is a delay until the echo canceler operates. S1 is closed so that a part of the head of the training signal may drop out. Normal reception by FAX2 may not be possible, and transmission may not be started.

(Countermeasure A)

When the international line mode is ON in the service mode (code No. 521), a dummy signal is attached to the head of the training signal to prevent this problem. As this is normally ON, it is necessary to reconfirm that this has not become OFF. When the international mode is switched

OFF, the transmission side will try the training signal three times at each speed (9600BPS, 4800BPS and 2400BPS). If NG, it will drop the speed by one rank (fall-back). When the international mode is switched ON, each speed will be tried only twice. In other words, the slower speed with fewer errors can be accessed more easily. This is done because the line conditions may deteriorate and the picture may be disturbed more easily during communication for international lines or long distance communication, even when the training is OK. The default value is ON as preference is given to clearer pictures rather than speed.

(Cause B)

The echo canceler operation stops with a 2100Hz signal. (i.e. S1 and S2 become ON). Accordingly, when FAX1 has executed automatic reception, a CED signal is output. If this signal is 2100Hz, S1 and S2 will become ON. Then the echo of the DIS signal output afterwards may be received and FAX1 may execute an erroneous operation, preventing communication from starting.

(Countermeasure B)

In the service mode, the CED signal frequency is set to 1100 Hz (code No.520), or the time setting between the CED signal and the DIS signal is set from 75 msec to 500 msec in the service mode (code No.593). This is because the echo canceler operation stop mode is canceled by an interval of 250 msec or more. / Reduce receiving sensitivity to reduce the effect of RCV echo signal. (Service mode: code No. 598)

(Cause C)

This model is FAX1 and the other party is FAX2.

For transmission from this model to FAX2, FAX2 executes automatic reception and transmits a CED signal (2100 Hz) followed by a DIS signal. As the echo cancelers stops as described in cause B, the echo of the DIS signal returns to FAX2. On the other hand, this model detects the DIS signal and transmits a DCS signal. In other words, it is possible that the echo of the DIS signal and the DCS signal transmitted from this model reach FAX2 one after the other. FAX2 detects an error and communication does not start.

(Countermeasure C)

When the international DIS detection setting is set in the service mode (code No.594), this model does not respond to the first DIS signal and returns a DCS signal only for the second DIS signal. In other words, there is an interval of 250 msec between transmission of the first and second DIS signal so that the echo cancelers operation recovers. An echo is not generated for the second DIS signal.

Note:

When the other FAX does not respond with a DCS signal after DIS signal transmission, the DIS signal is transmitted three times for trial.

Summary:

Symptom/Countermeasure Table (Long distance and international communication operations)

SYMPTOM	COUNTERMEASURE
Does not receive in the automatic mode.	1. If possible, manual transmission should be done from the transmission side. 2. If possible, two pauses should be inserted at the end of the auto dial number on the transmission side. 3. If possible, the Function Selector Switch should be switched to FAX.
Does not transmit.	1. Confirm the international line mode is ON. (Service mode: code No. 521) 2. Set the international DIS detection. (Service mode: code No. 594)
Does not receive.	1. Set the time setting between the CED signal and the DIS signal to 500 msec. (Service mode: code No. 593) 2. Set the CED frequency to 1100Hz. (Service mode: code No. 520) 3. Reduce the RCV sensitivity. (Service mode: code No. 598)

2.3.5.1.6. THE UNIT CAN COPY, BUT THE TRANSMISSION AND RECEPTION IMAGE ARE INCORRECT

(Long distance or international communication operation)

This symptom highly depends on the transmission and reception capability of the other FAX unit and the line conditions.

The countermeasures for this unit are shown below.

Transmission Operation:

Set the transmitting speed to 4800BPS (service mode: code No. 717) or select the overseas mode.

Reception Operation:

If 80% or more of the reception is incorrect, set the receiving speed to 4800BPS. (Service mode: code No. 718)

- Refer to 2.4.4. SERVICE FUNCTION TABLE().

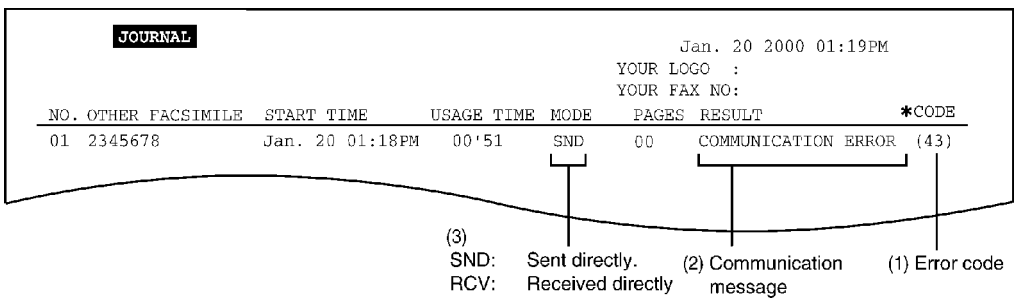
2.3.5.1.7. HOW TO OUTPUT THE JOURNAL REPORT

1. Press the MENU button two times.

2. Rotate SPEED DIRECTOR until the " JOURNAL REPORT " is displayed.

3. Press the SET button.

4. The report prints out.


JOURNAL
Jan. 20 2000 01:19PM
YOUR LOGO :
YOUR FAX NO:
NO. OTHER FACSIMILE START TIME USAGE TIME MODE PAGES RESULT *CODE
01 2345678 Jan. 20 01:18PM 00'51 SND 00 COMMUNICATION ERROR (43)
(3)
SND: Sent directly.
RCV: Received directly
(2) Communication message
(1) Error code

CROSS REFERENCE:

1.8. FEATURES()

Error code table:

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Cou mea
	PRESSED THE STOP KEY	SND & RCV	Communication was interrupted by the STOP button.	
	DOCUMENT JAMMED	SND	The document paper is jammed.	
	NO DOCUMENT	SND	No document paper.	
	THE COVER WAS OPENED	SND & RCV	The cover is open.	
40	NO RESPONSE	SND	Transmission is finished when the T1 TIMER expires.	
41	COMMUNICATION ERROR	SND	DCN is received after DCS transmission.	
42	COMMUNICATION ERROR	SND	FTT is received after transmission of a 2400BPS training signal.	
43	COMMUNICATION ERROR	SND	No response after post message is transmitted three times.	
44	COMMUNICATION ERROR	SND	RTN and PIN are received.	
46	COMMUNICATION ERROR	RCV	No response after FTT is transmitted.	
48	COMMUNICATION ERROR	RCV	No post message.	
49	COMMUNICATION ERROR	RCV	RTN is transmitted.	
50	COMMUNICATION ERROR	RCV	PIN is transmitted (to PRI-Q).	
51	COMMUNICATION ERROR	RCV	PIN is transmitted.	
52	NO RESPONSE	RCV	Reception is finished when the T1 TIMER expires.	
54	ERROR-NOT YOUR UNIT	RCV	DCN is received after DIS transmission.	
58	COMMUNICATION ERROR	RCV	DCN is received after FTT transmission.	
59	ERROR-NOT YOUR UNIT	SND	DCN responds to the post message.	
65	COMMUNICATION ERROR	SND	DCN is received before DIS reception.	
65	COMMUNICATION ERROR	RCV	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	
68	COMMUNICATION ERROR	RCV	No response at the other party after MCF or CFR is transmitted.	

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Cou mea
70	ERROR-NOT YOUR UNIT	RCV	DCN is received after CFR transmission.	
72	COMMUNICATION ERROR	RCV	Carrier is cut when the image signal is received.	
75	MEMORY FULL	RCV	The document was not received due to memory full.	
79	CANCELED	SND	The multi-station transmission was rejected by the user.	
FF	COMMUNICATION ERROR	SND & RCV	Modem error. For the DCN, DCN, etc. abbreviations, refer to 6.6. MODEM SECTION ().	

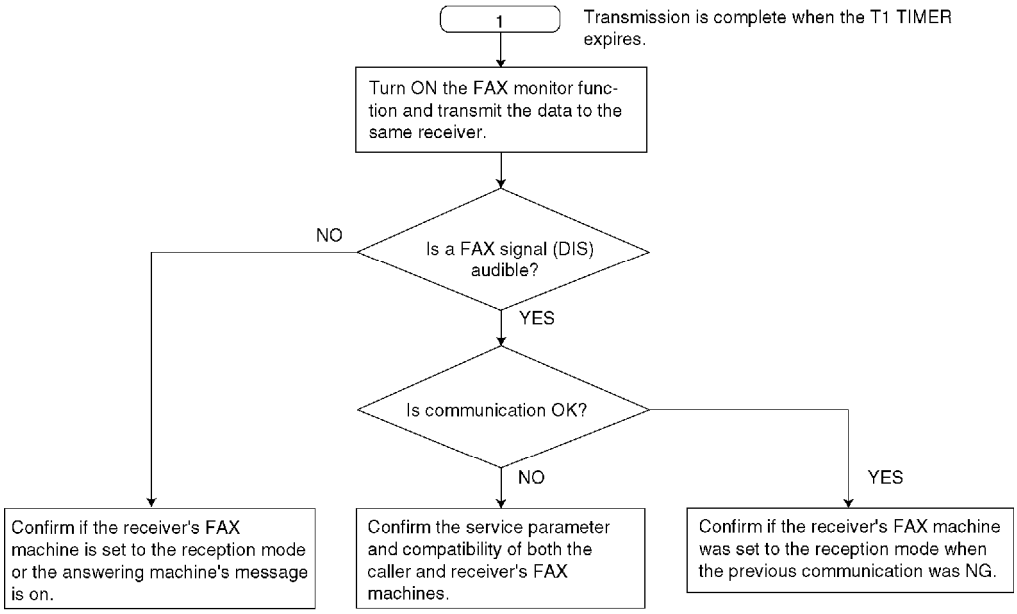
SND=TRANSMISSION RCV=RECEPTION

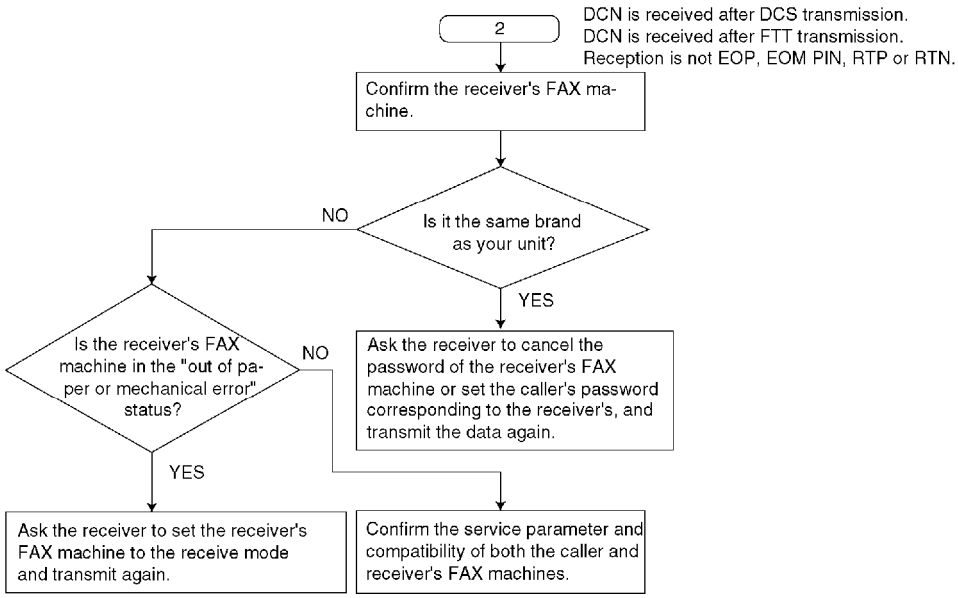
Most fax communication problems can be resolved by the following steps.

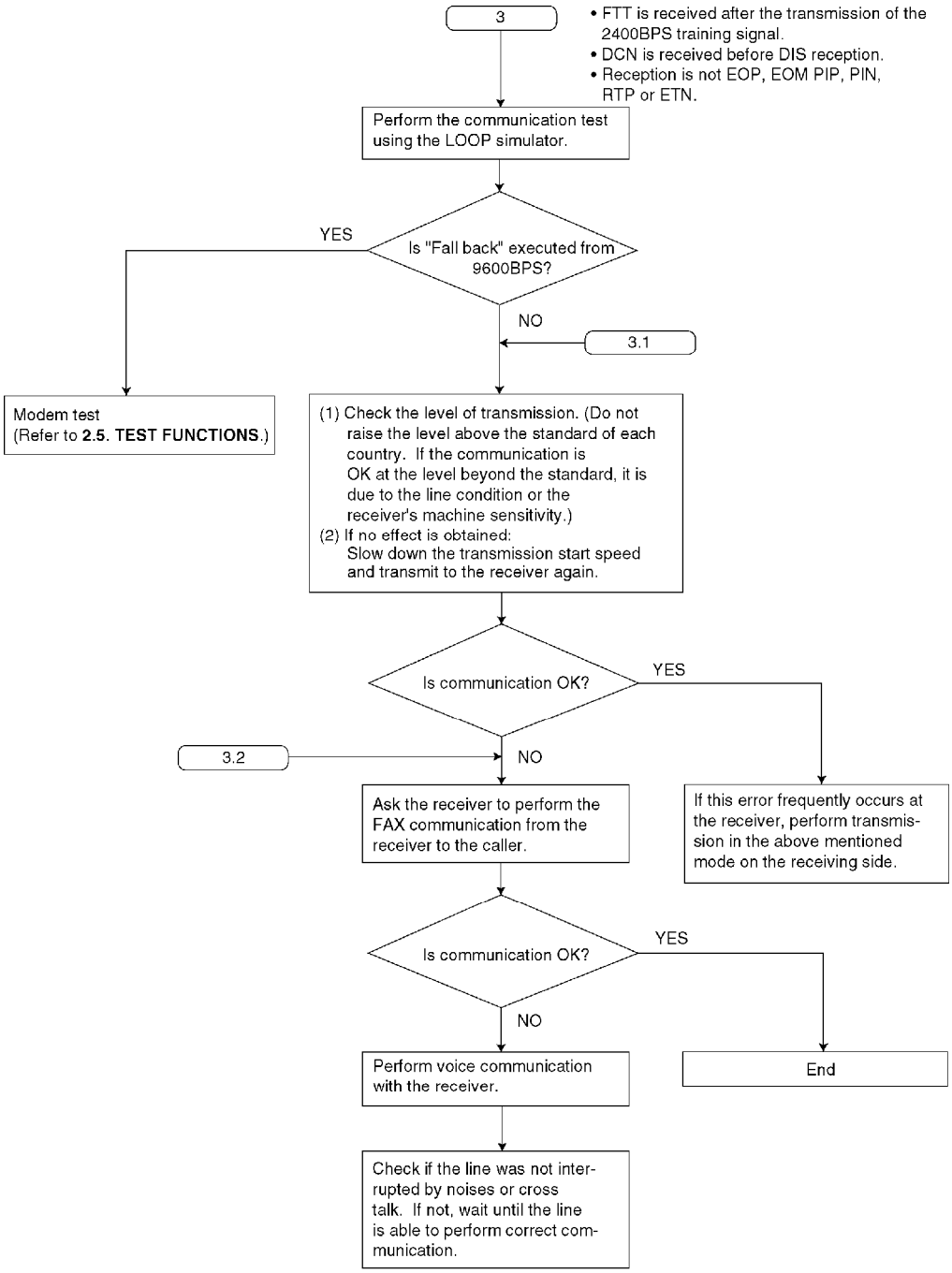
1. **Change the transmit level. (Service code: 596, refer to 2.4.4. SERVICE FUNCTION TABLE().)**
2. **Change the TX speed/RX speed. (Service code: 717/718, refer to 2.4.4. SERVICE FUNCTION TABLE ().)**

Note*:
If the problem remains, see the following "Countermeasure" flow chart.

Countermeasure

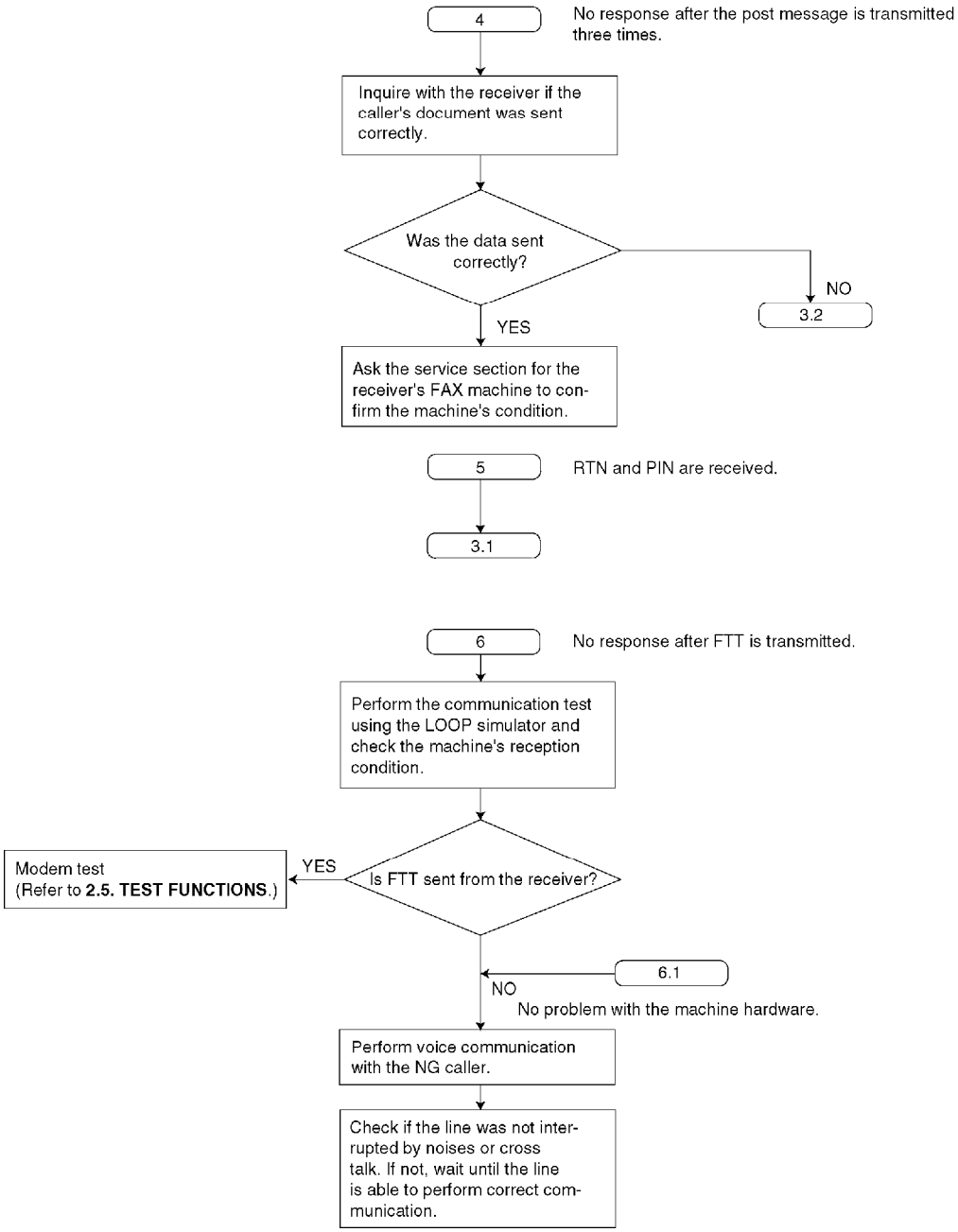

1
Transmission is complete when the T1 TIMER expires.
Turn ON the FAX monitor function and transmit the data to the same receiver.
Is a FAX signal (DIS) audible?
NO
YES
Is communication OK?
NO
YES
Confirm if the receiver's FAX machine is set to the reception mode or the answering machine's message is on.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.
Confirm if the receiver's FAX machine was set to the reception mode when the previous communication was NG.


2
DCN is received after DCS transmission.
DCN is received after FTT transmission.
Reception is not EOP, EOM PIN, RTP or RTN.
Confirm the receiver's FAX machine.
Is it the same brand as your unit?
NO
YES
Is the receiver's FAX machine in the "out of paper or mechanical error" status?
NO
YES
Ask the receiver to cancel the password of the receiver's FAX machine or set the caller's password corresponding to the receiver's, and transmit the data again.
Ask the receiver to set the receiver's FAX machine to the receive mode and transmit again.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.


3
• FTT is received after the transmission of the 2400BPS training signal.
• DCN is received before DIS reception.
• Reception is not EOP, EOM PIP, PIN, RTP or ETN.
Perform the communication test using the LOOP simulator.
Is "Fall back" executed from 9600BPS?
YES
NO
3.1
Modem test
(Refer to 2.5. TEST FUNCTIONS.)
(1) Check the level of transmission. (Do not raise the level above the standard of each country. If the communication is OK at the level beyond the standard, it is due to the line condition or the receiver's machine sensitivity.)
(2) If no effect is obtained:
Slow down the transmission start speed and transmit to the receiver again.
Is communication OK?
YES
3.2
NO
Ask the receiver to perform the FAX communication from the receiver to the caller.
If this error frequently occurs at the receiver, perform transmission in the above mentioned mode on the receiving side.
Is communication OK?
YES
NO
Perform voice communication with the receiver.
End
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

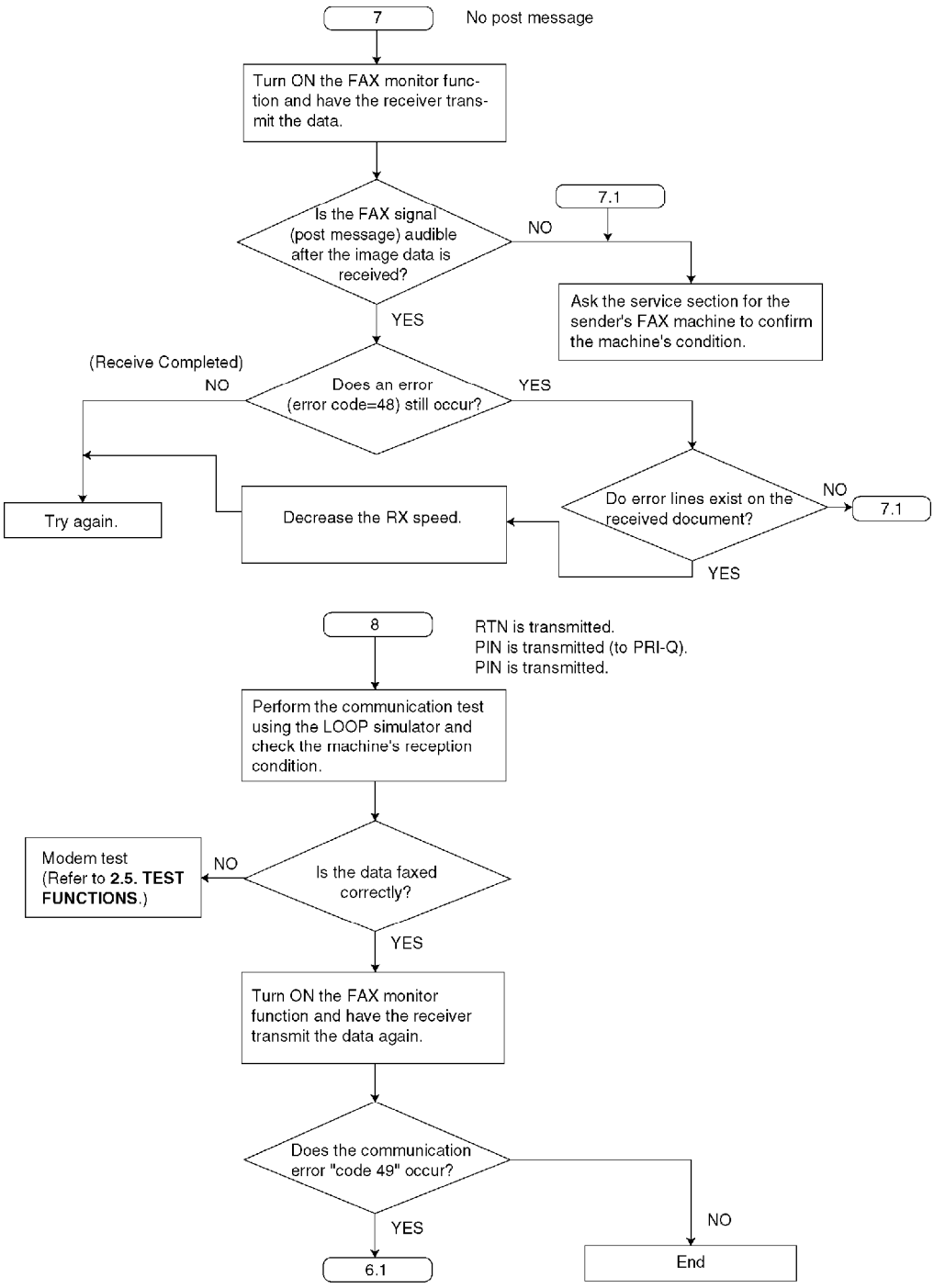
CROSS REFERENCE:

2.5. TEST FUNCTIONS()


4
No response after the post message is transmitted three times.
Inquire with the receiver if the caller's document was sent correctly.
Was the data sent correctly?
NO
3.2
YES
Ask the service section for the receiver's FAX machine to confirm the machine's condition.
5
RTN and PIN are received.
3.1
6
No response after FTT is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test
(Refer to 2.5. TEST FUNCTIONS.)
YES
Is FTT sent from the receiver?
6.1
NO
No problem with the machine hardware.
Perform voice communication with the NG caller.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

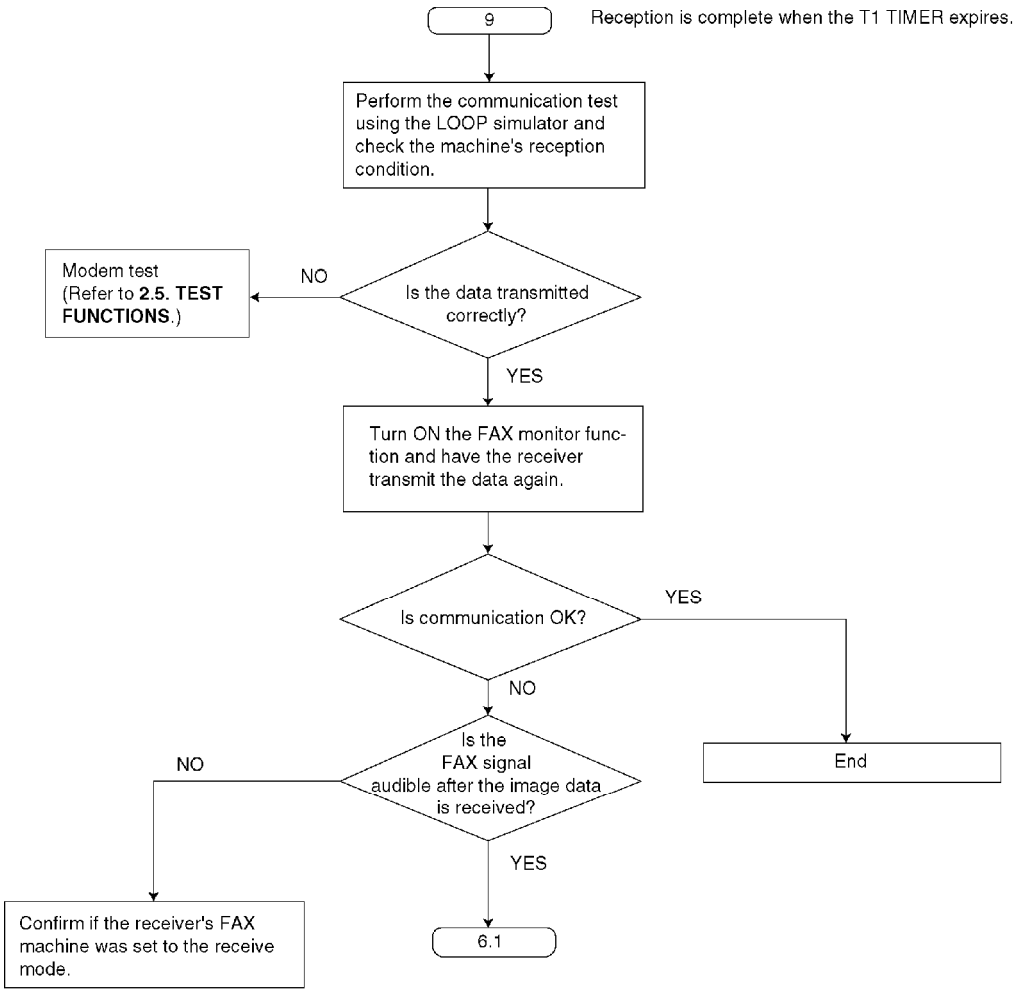
CROSS REFERENCE:

2.5. TEST FUNCTIONS()


7
No post message
Turn ON the FAX monitor function and have the receiver transmit the data.
Is the FAX signal (post message) audible after the image data is received?
NO
7.1
Ask the service section for the sender's FAX machine to confirm the machine's condition.
YES
(Receive Completed)
NO
Does an error (error code=48) still occur?
YES
Try again.
Decrease the RX speed.
Do error lines exist on the received document?
NO
7.1
YES
8
RTN is transmitted.
PIN is transmitted (to PRI-Q).
PIN is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test (Refer to 2.5. TEST FUNCTIONS.)
NO
Is the data faxed correctly?
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Does the communication error "code 49" occur?
YES
6.1
NO
End

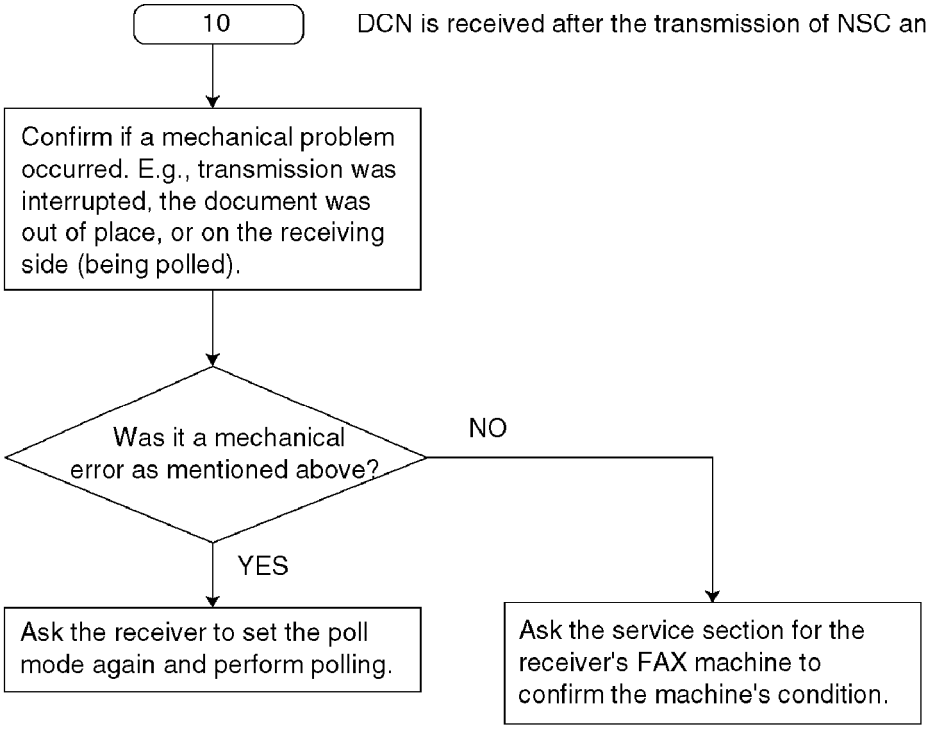
CROSS REFERENCE:

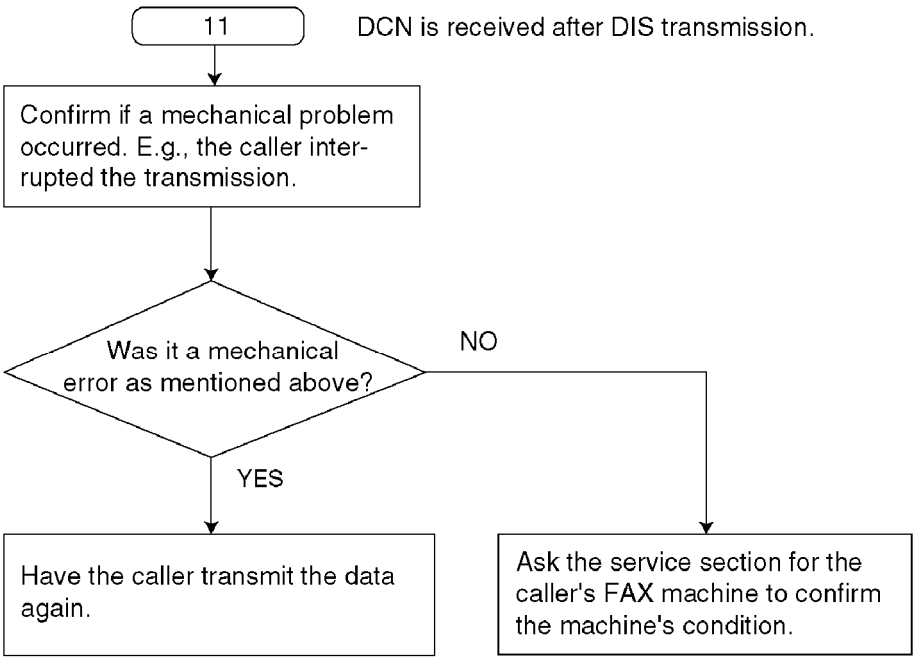
2.5. TEST FUNCTIONS()

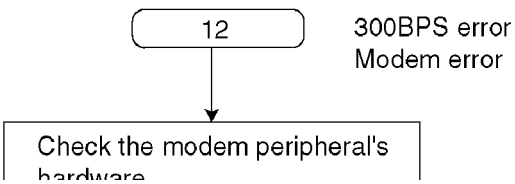

9
Reception is complete when the T1 TIMER expires.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is the data transmitted correctly?
NO
Modem test (Refer to 2.5. TEST FUNCTIONS.)
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Is communication OK?
YES
End
NO
Is the FAX signal audible after the image data is received?
NO
YES
Confirm if the receiver's FAX machine was set to the receive mode.
6.1

CROSS REFERENCE:

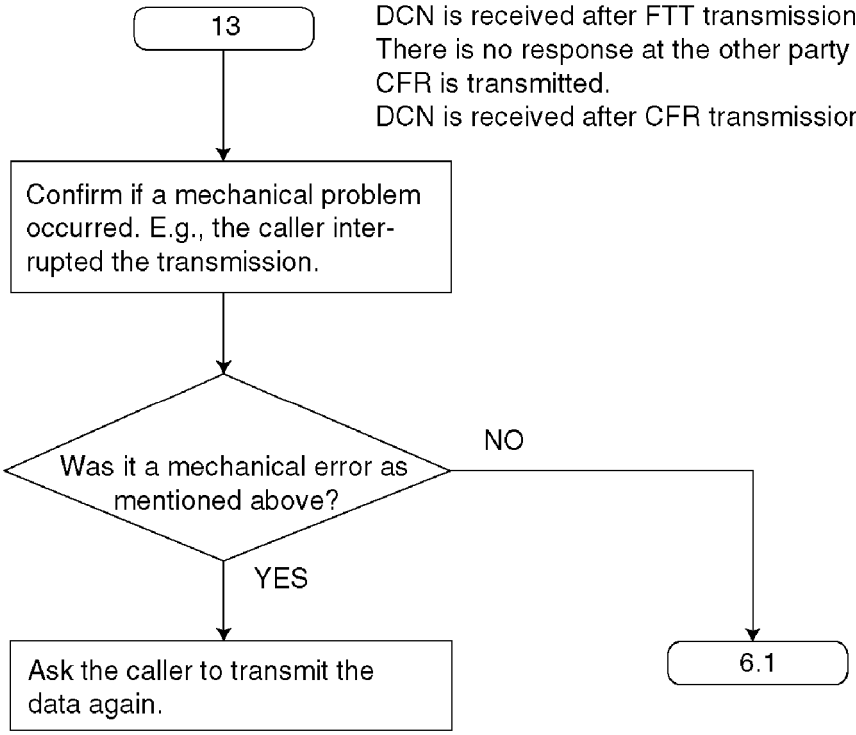
2.5. TEST FUNCTIONS()

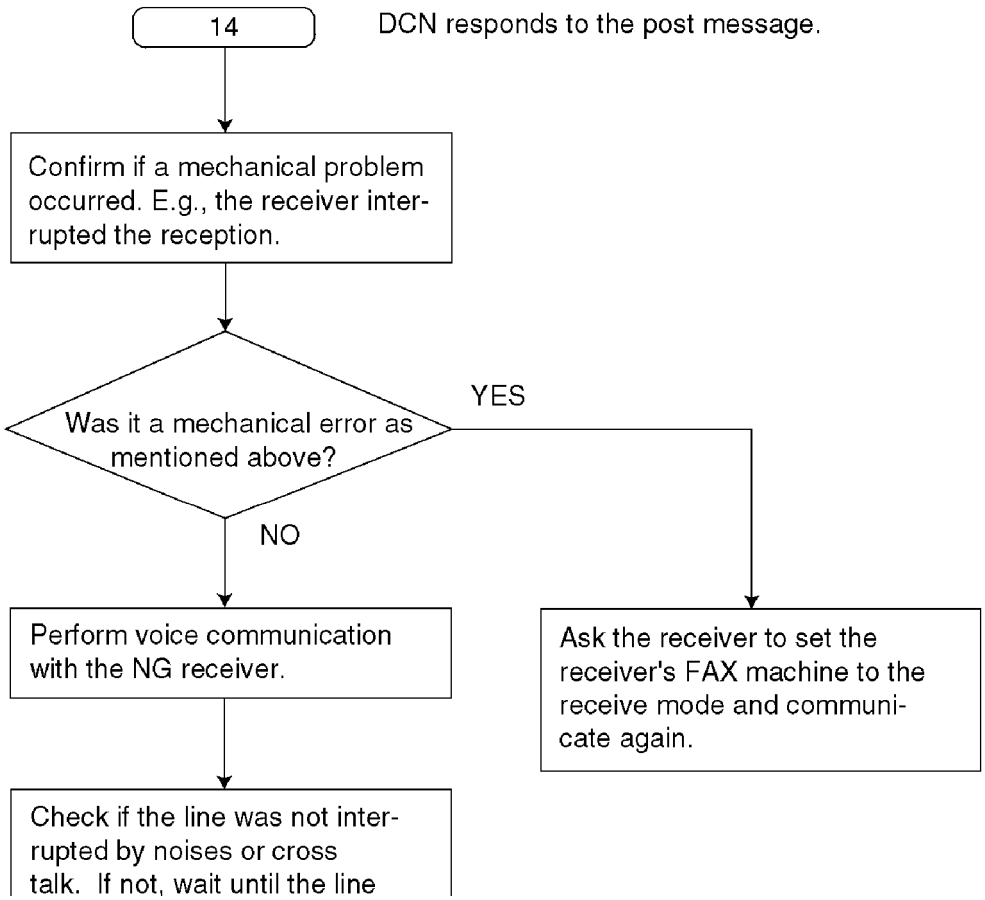

10
DCN is received after the transmission of NSC and DTC.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.

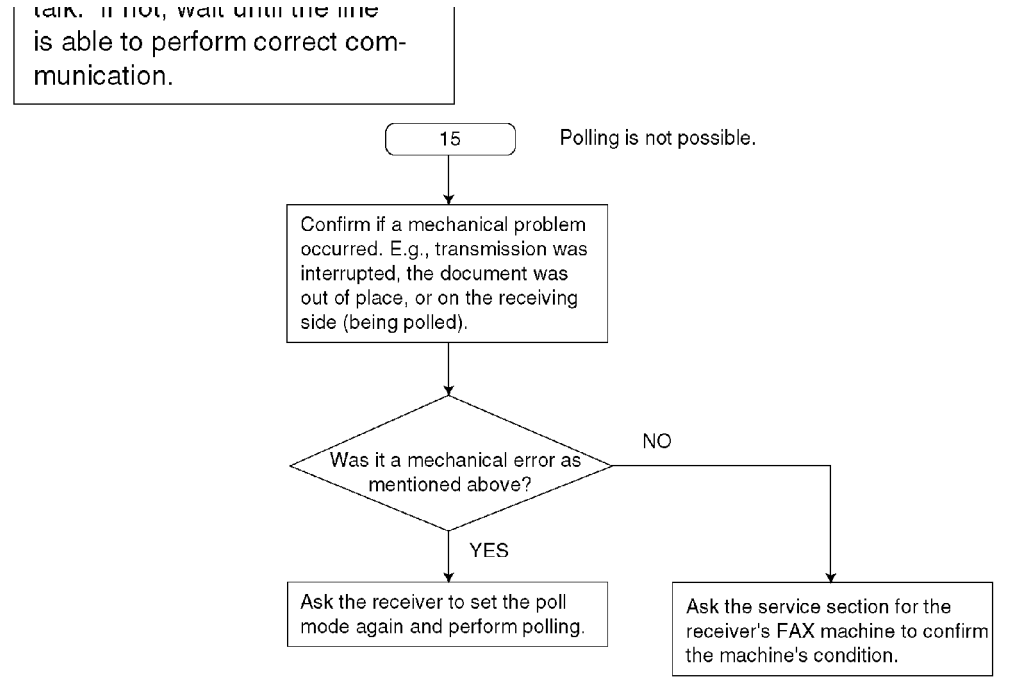

11
DCN is received after DIS transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Have the caller transmit the data again.
Ask the service section for the caller's FAX machine to confirm the machine's condition.

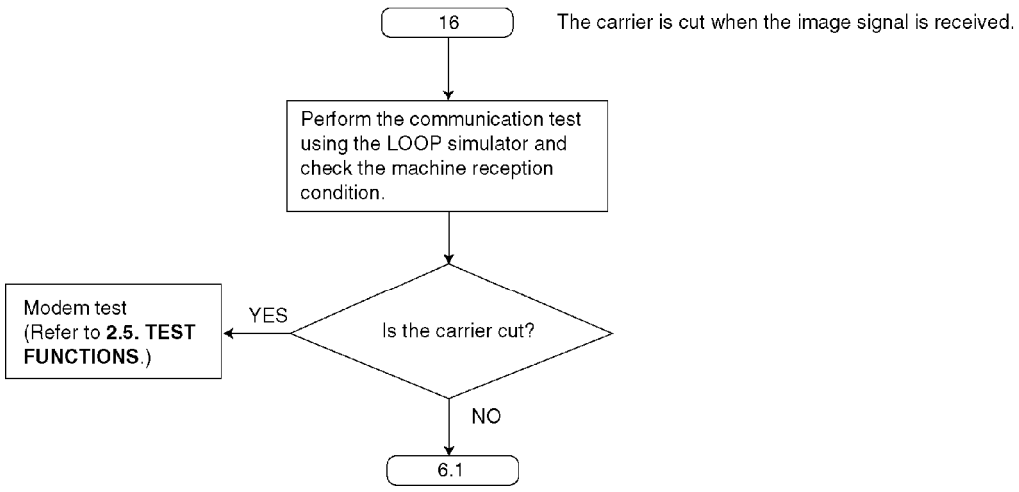

12
300BPS error
Modem error
Check the modem peripheral's hardware

hardware.


13
DCN is received after FTT transmission.
There is no response at the other party after MCF or CFR is transmitted.
DCN is received after CFR transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Ask the caller to transmit the data again.
6.1


14
DCN responds to the post message.
Confirm if a mechanical problem occurred. E.g., the receiver interrupted the reception.
Was it a mechanical error as mentioned above?
YES
NO
Perform voice communication with the NG receiver.
Ask the receiver to set the receiver's FAX machine to the receive mode and communicate again.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line


talk. If not, wait until the line is able to perform correct communication.
15
Polling is not possible.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.


16
The carrier is cut when the image signal is received.
Perform the communication test using the LOOP simulator and check the machine reception condition.
Modem test
(Refer to 2.5. TEST FUNCTIONS.)
YES
Is the carrier cut?
NO
6.1

CROSS REFERENCE:
2.5. TEST FUNCTIONS()

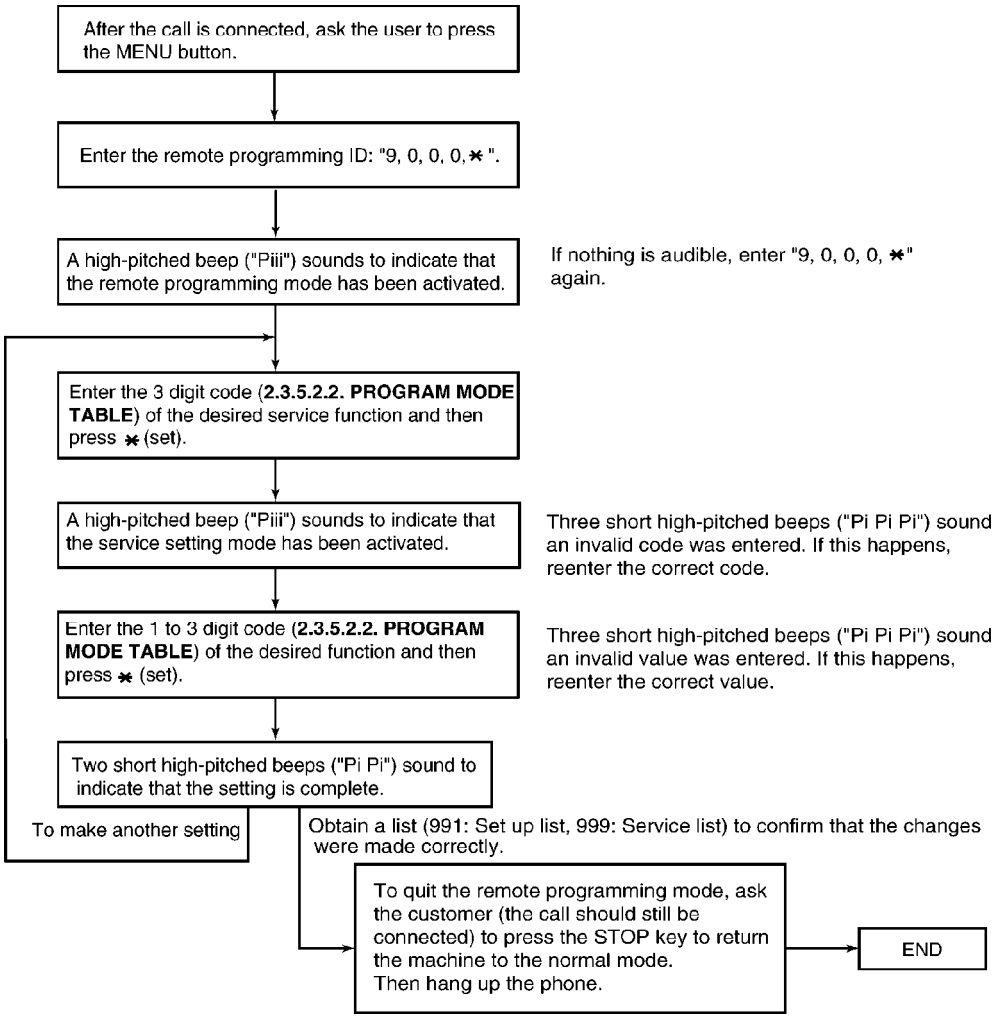
2.3.5.2. REMOTE PROGRAMMING

If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (2.3.5.2.2. PROGRAM MODE TABLE()). The function used to accomplish this is remote programming.

First, in order to check the current status of the service code parameter, print out the setup list (code: 991) and the service list (code: 999) from the customer's fax machine.
Based on this, the parameters for the desired codes can be changed.
The procedure for changing and listing parameters is described on 2.3.5.2.1. ENTERING THE REMOTE PROGRAMMING MODE AND CHANGING SERVICE CODES(). Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that the changes were made correctly.

Hint:
Since the connected telephone is in use during the remote programming mode, it may be helpful to ask the customer to switch to the speakerphone. This frees the customer from the need to remain right next to the fax while you are making parameter settings. When finished, inform the customer. Also note that in very noisy locations where the DTMF tones are not audible, the remote programming function will not work.

2.3.5.2.1. ENTERING THE REMOTE PROGRAMMING MODE AND CHANGING SERVICE CODES


After the call is connected, ask the user to press the MENU button.
Enter the remote programming ID: "9, 0, 0, 0, ✱ ".
A high-pitched beep ("Piii") sounds to indicate that the remote programming mode has been activated.
If nothing is audible, enter "9, 0, 0, 0, ✱" again.
Enter the 3 digit code (2.3.5.2.2. PROGRAM MODE TABLE) of the desired service function and then press ✱ (set).
A high-pitched beep ("Piii") sounds to indicate that the service setting mode has been activated.
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid code was entered. If this happens, reenter the correct code.
Enter the 1 to 3 digit code (2.3.5.2.2. PROGRAM MODE TABLE) of the desired function and then press ✱ (set).
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid value was entered. If this happens, reenter the correct value.
Two short high-pitched beeps ("Pi Pi") sound to indicate that the setting is complete.
To make another setting
Obtain a list (991: Set up list, 999: Service list) to confirm that the changes were made correctly.
To quit the remote programming mode, ask the customer (the call should still be connected) to press the STOP key to return the machine to the normal mode.
Then hang up the phone.
END

CROSS REFERENCE:
2.3.5.2.2. PROGRAM MODE TABLE()

2.3.5.2.2. PROGRAM MODE TABLE

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	mm/dd/yy hh:mm	Jan/01/00	NG
002	Your logo	---------	None	NG
003	Your fax number	---------	None	NG
004	Print sending report	1:Error / 2:ON / 3:OFF	Error	OK
006	FAX ring count	1 to 5 rings (for ext. tam)	3	OK
012	Remote TAM activation	ON / OFF	ON / ID=11	NG
013	Dialing mode	1:Tone / 2:Pulse	Tone	OK
022	Auto journal print	1:ON / 2:OFF	ON	OK
023	Overseas mode	NEXT FAX / ERROR / OFF	ERROR	OK
025	Delayed transmission	ON / OFF	OFF	NG
030	Silent FAX recognition ring	3 to 6 rings	3	OK
031	Distinctive ring	1:OFF / 2:A / 3:B / 4:C / 5:D	OFF	OK
036	Rx reduction	1:72% / 2:86% / 3:92% / 4: 100%	92%	OK
039	LCD contrast	1:Normal / 2:Darker	Normal	NG
040	Silent detection	1:ON / 2:OFF	OFF	OK
041	Remote FAX activation code	ON / OFF	OFF ID=*9	NG
044	Receive alert	1:ON / 2:OFF	ON	OK
046	Friendly receive	1:ON / 2:OFF	ON	OK
048	LANGAGE	1:ENGLISH / 2:FRENCH	ENGLISH	OK
049	Auto disconnect	ON / OFF	ON	NG
070	FAX pager	ON / OFF	OFF	NG
076	FAX tone	1:ON / 2:OFF	ON	OK
077	Auto answer mode	1:FAX only 2:TEL/FAX	FAX only	OK
078	TEL/FAX ring	1 to 4 rings	1	OK
080	Set default	YES / NO	NO	NG
501	Pause time set	001~600 x 100msec	050	OK
502	Flash time	01~99 x 10ms	70	OK
503	Dial speed	1:10pps / 2:20 pps	10pps	OK
511	Vox sense	1:High / 2:Low	High	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100	OK
521	International mode select	1:ON / 2:OFF	ON	OK
522	Auto standby select	1:ON / 2:OFF	ON	OK
523	Receive equalizer select	1:ON / 2:OFF	OFF	OK
550	Memory clear	---------	---------	NG
551	ROM check	---------	---------	NG
552	DTMF signal tone test	ON / OFF	OFF	OK
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	---------	---------	NG

Code	Function	Set Value	Default	Remote Setting
555	Scanner test	---------	---------	NG
556	Motor test	---------	---------	NG
557	LED test	---------	---------	NG
558	LCD test	---------	---------	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00~99	00	OK
572	ITS auto redial line disconnection time set	001~999sec	30	OK
573	Remote turn-on ring number	01~99	15	OK
590	FAX auto redial time set	00~99	02	OK
591	FAX auto redial line disconnection time set	001~999sec	045	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit value	001~999	100	OK
596	Transmit level set	-15~00dBm	10	OK
598	Receiving Sensitivity	20~48	41	OK
602	Warning list printing	1:ON / 2:OFF	ON	OK
700	EXT. TAM OGM Rec. time	01~99sec	10sec	OK
701	No voice detect time	01~99 × 100msec	50	OK
717	Transmit speed select	1:9600/ 2:7200/ 3:4800/ 4: 2400	9600bps	OK
718	Receive speed select	1:9600/ 2:7200/ 3:4800/ 4: 2400	9600bps	OK
719	Ringer off in TEL/FAX mode	1:ON / 2:OFF	ON	OK
721	Pause tone detect	1:ON / 2:OFF	ON	OK
722	Redial tone detect	1:ON / 2:OFF	OFF	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	30s	OK
771	T1 timer	1:35s / 2:60s	35s	OK
774	T4 timer	00~99 × 100ms	00	OK
815	Sensor & VOX test	---------	---------	NG
852	Print test pattern	---------	---------	NG
853	Top margin	1~9	5	OK
854	Left margin	1~8	5	OK
880	History list	1:Start	---------	NG
881	Journal 2	---------	---------	NG
882	Journal 3	---------	---------	NG
890	TEL/FAX ring back tone	1:ON / 2:OFF	ON	OK
991	Setup list	1:Start	---------	OK
994	Journal list	1:Start	---------	OK
995	Journal 2 list	1:Start	---------	OK

Code	Function	Set Value	Default	Remote Setting
996	Journal 3 list	1:Start	---------	OK
998	History list	1:Start	---------	OK
999	Service list	1:Start	---------	OK

OK means "can set".
NG means "can not set".

Note:
Refer to 2.4.4. SERVICE FUNCTION TABLE () for descriptions of the individual codes.

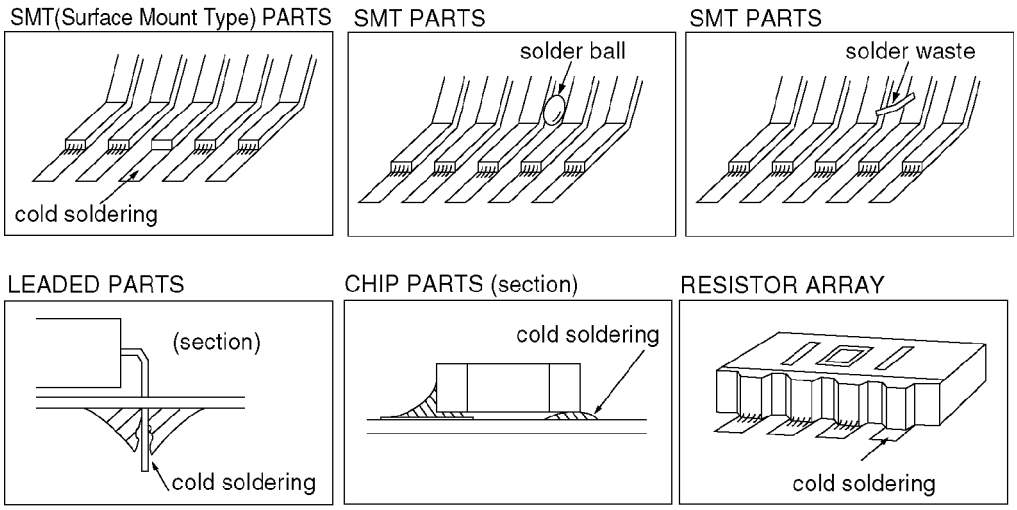
Example:
If you want to set value in the "004 Transmission report mode", press the dial key number 1,2 or 3 corresponding to the Set Value you want to select. (1:ERROR/2:ON/3:OFF)

2.3.6. DIGITAL BOARD SECTION

When the unit fails to boot up the system, take the troubleshooting procedures very carefully. It may have a serious problem.

The symptom: No response when the power is turned on. (No LCD display, and keys are not accepted.)

The first step is to check the power source. If there is no problem with the power supply unit, the problem may lie in the digital unit (main board).
As there are many potential causes in this case (ASIC, DRAM, etc.), it may be difficult to specify what you should check first. If a mistake is made in the order of checks, a normal part may be determined faulty, wasting both time and money.
Although the tendency is to regard the problem as a serious one (IC malfunction, etc.), usually most cases are caused by solder faults (poor contact due to a tunnel in the solder, signal short circuit due to solder waste).



Note:

1. **Electrical continuity may have existed at the factory check, but a faulty contact occurred as a result of vibration, etc., during transport.**
2. **Solder waste remaining on the board may get caught under the IC during transport, causing a short circuit.**

Before we begin mass production, several hundred trial units are produced at the plant, various tests are applied and any malfunctions are analyzed. (In past experiences, digital IC (especially SRAM, DRAM and ROM) malfunctions are extremely rare after installation in the product.)
This may be repaired by replacing the IC, (DRAM etc.). However, the real cause may not have been an IC malfunction but a soldering fault instead.
Soldering faults difficult to detect with the naked eye are common, particularly for ASIC and RA (Resistor Array). But if you have an oscilloscope, you can easily determine the problem site or IC malfunction by checking the main signal lines.
Even if you don't have such a measuring instrument, by checking each main signal line and resoldering it, in many cases the problem will be resolved.
An explanation of the main signals (for booting up the unit) is presented below.

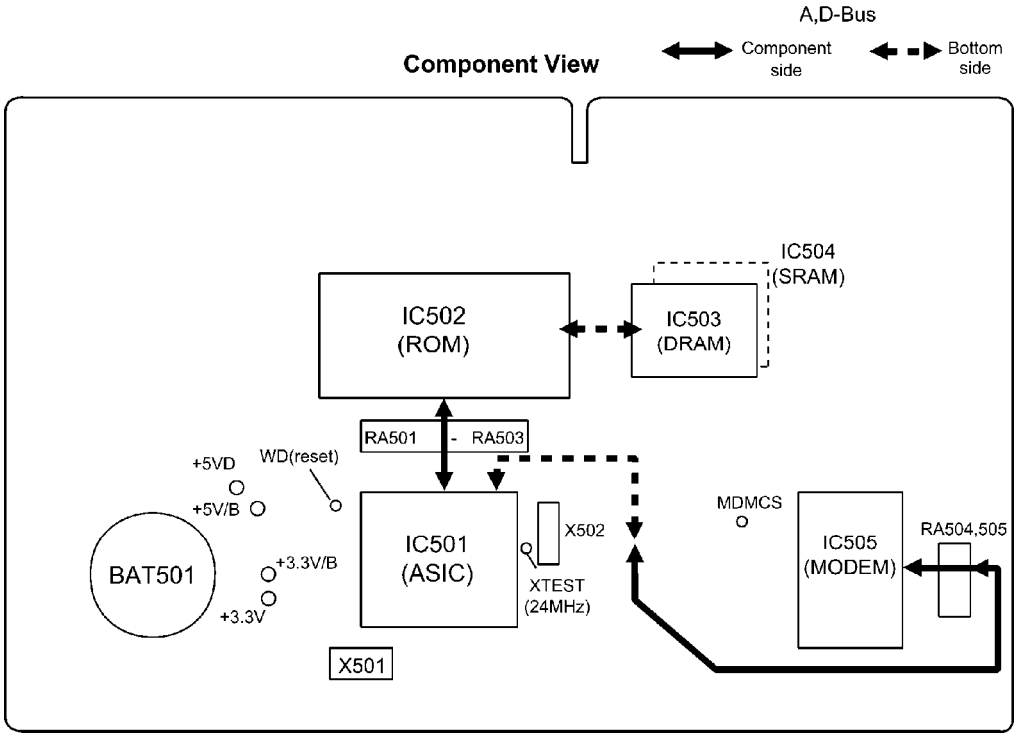
Don't replace ICs or stop repairing until checking the signal lines.
An IC malfunction rarely occurs. (By understanding the necessary signals for booting up the unit, the "Not Boot up" display is not a serious problem.)

What are the main signals for booting up the unit?

Please refer to 2.3.6.1. DIGITAL BLOCK DIAGRAM ().
The ASIC (IC501) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the ROM (IC502), then follows the instructions for

controlling each IC. All ICs have some inner registers that are assigned to a certain address. It is the address bus by which the ASIC designates the location inside each IC. And the data bus reads or writes the data in order to transmit the instructions from the ASIC to the ICs. These signal lines are all controlled by voltages of 5V (H) or 0V (L).

2.3.6.1. DIGITAL BLOCK DIAGRAM



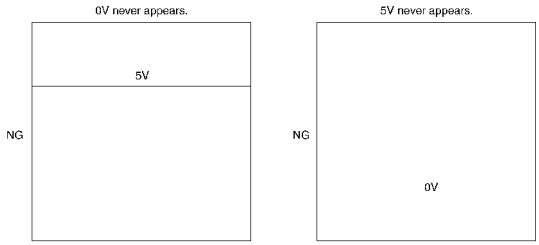
You also need to check the signal lines listed here [List 1] when the unit fails to boot up the system. Those signal lines should remain normal. Other signal lines are not directly related to that failure even if they have faults or troubles.

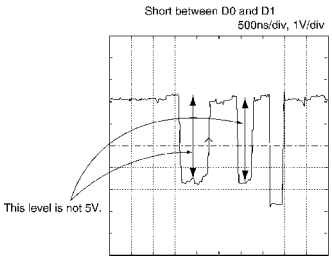
[List 1]

①	D0～D7	(Data Bus)
②	A0～A15	(Address Bus)
③	$\overline{RD}$	(Read Signal)
	$\overline{ROMCS}$	(ROM Select Signal)
	$\overline{WR}$	(Write Signal)
	$\overline{RAMCS}$	(SRAM Select Signal)
④	RBA0～RBA5	(Bank Address Signal)
⑤	$\overline{RAS}$	(DRAM Row Address Strobe Signal)
	$\overline{CAS}$	(DRAM Column Address Strobe Signal)
⑥	$\overline{MDMCS}$	(Modem Select Signal)

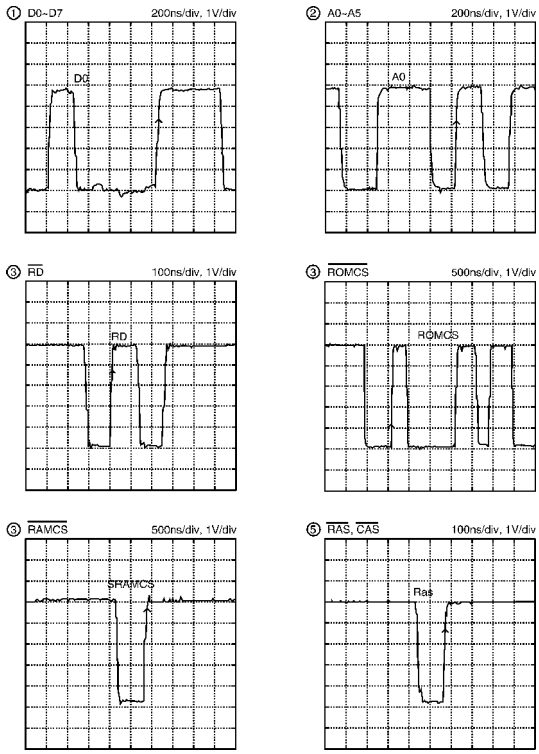
As long as these signals remain normal, once the power is turned on, each IC can repeatedly output 5V (H) and 0V (L). The following shows NG and normal wave patterns.

NG Wave pattern **(Refer to NG EXAMPLE)**





Normal Wave Patterns



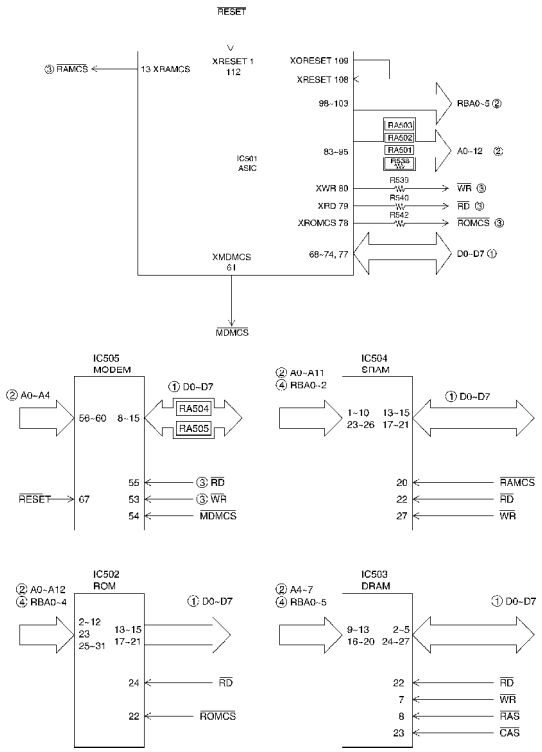
Remarks:
When you use an oscilloscope to judge whether a signal to be tested is normal or NG, perform

the signal check in exactly the same order as in [List 1]. (If the ASIC fails to access the ROM, the ASIC cannot access SRAM or DRAM normally.)

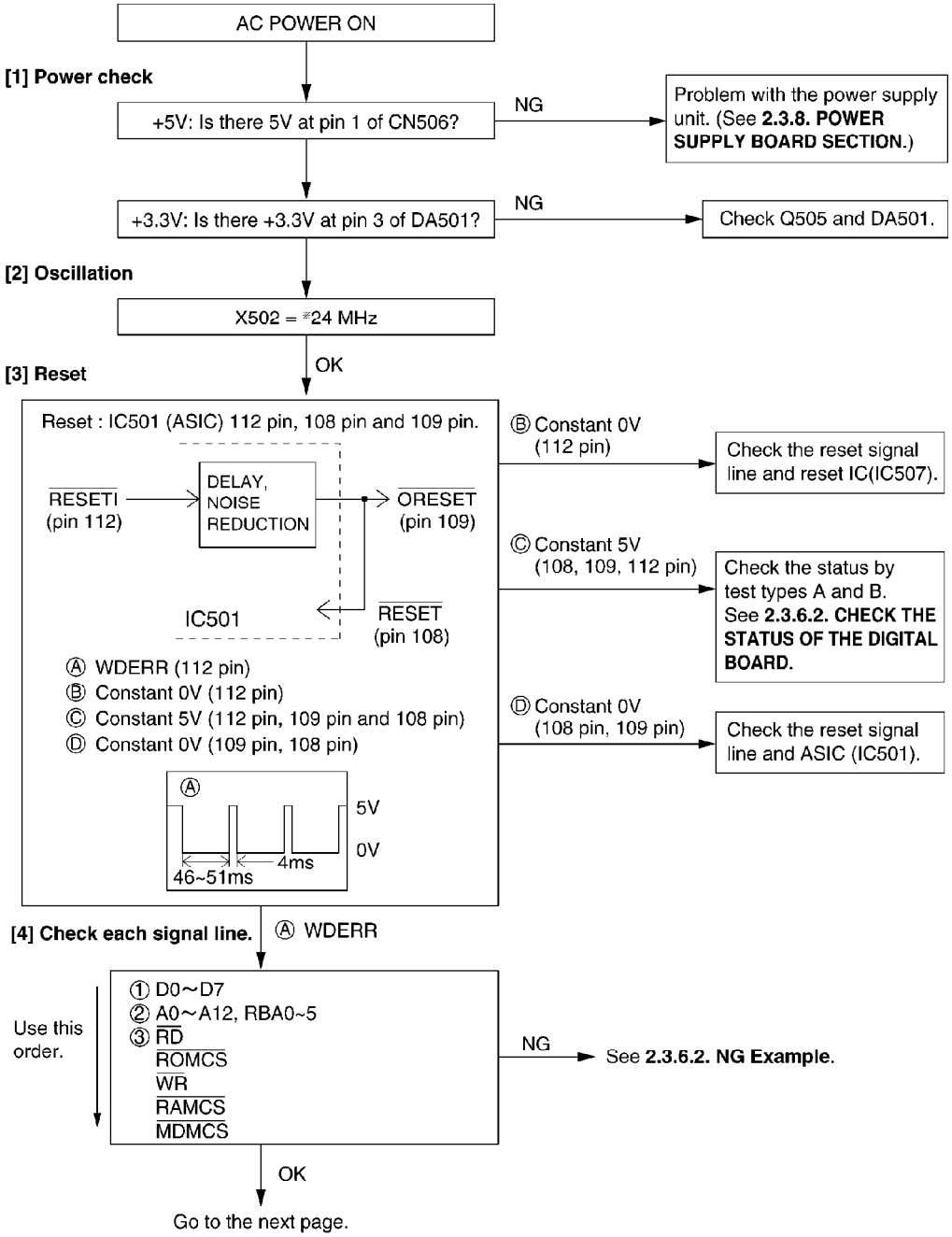
The digital circuit actually operates according to the timing combinations of these signals. If the timing of these signals is even slightly delayed, the circuit will not work. Nor will it if the IC is defective and the output voltage level is not normal although the timing of these signals is accurate enough to meet the specifications. (Make sure that your oscilloscope is calibrated before starting a test.)
Therefore, it is imperative to confirm whether each IC outputs the signal at the correct level. (See the I/O Pin No. Diagram.) The signal level should be constantly output at between 5V (H) and 0V (L) as described earlier.

Note:
Simply check the output level and make sure if the IC repeatedly outputs the signal at between 5V (H) and 0V (L).

I/O and Pin No. Diagram



After the power is turned on, the ASIC initializes and checks each IC.
The ROM, SRAM, and modem are checked.
If initialization fails for the ICs , the system will not boot up.
In this case, please find the cause as follows.

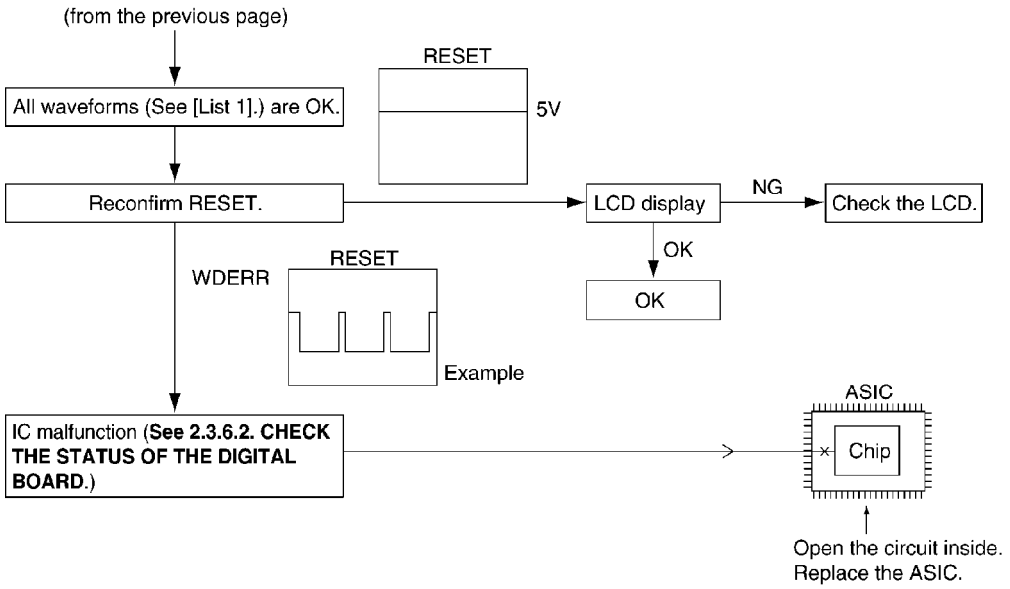

AC POWER ON
[1] Power check
+5V: Is there 5V at pin 1 of CN506?
NG
Problem with the power supply unit. (See 2.3.8. POWER SUPPLY BOARD SECTION.)
+3.3V: Is there +3.3V at pin 3 of DA501?
NG
Check Q505 and DA501.
[2] Oscillation
X502 = 24 MHz
OK
[3] Reset
Reset : IC501 (ASIC) 112 pin, 108 pin and 109 pin.
RESETI (pin 112)
DELAY, NOISE REDUCTION
ORESET (pin 109)
IC501
RESET (pin 108)
Ⓐ WDERR (112 pin)
Ⓑ Constant 0V (112 pin)
Ⓒ Constant 5V (112 pin, 109 pin and 108 pin)
Ⓓ Constant 0V (109 pin, 108 pin)
Ⓐ
5V
0V
4ms
46~51ms
Ⓑ Constant 0V (112 pin)
Check the reset signal line and reset IC(IC507).
Ⓒ Constant 5V (108, 109, 112 pin)
Check the status by test types A and B. See 2.3.6.2. CHECK THE STATUS OF THE DIGITAL BOARD.
Ⓓ Constant 0V (108 pin, 109 pin)
Check the reset signal line and ASIC (IC501).
[4] Check each signal line.
Ⓐ WDERR
Use this order.
① D0~D7
② A0~A12, RBA0~5
③ RD
ROMCS
WR
RAMCS
MDMCS
NG
See 2.3.6.2. NG Example.
OK
Go to the next page.

CROSS REFERENCE:

2.3.6.2. NG EXAMPLE()

2.3.6.3. CHECK THE STATUS OF THE DIGITAL BOARD()

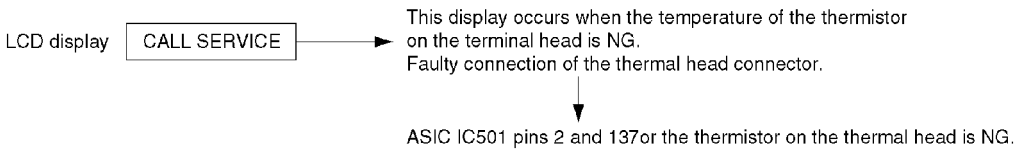
2.3.8. POWER SUPPLY BOARD SECTION()



CROSS REFERENCE:

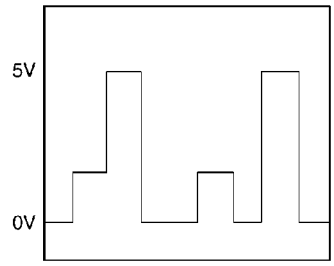
2.3.6.3. CHECK THE STATUS OF THE DIGITAL BOARD()

Other NG example while the power is ON and the LCD displays the following.

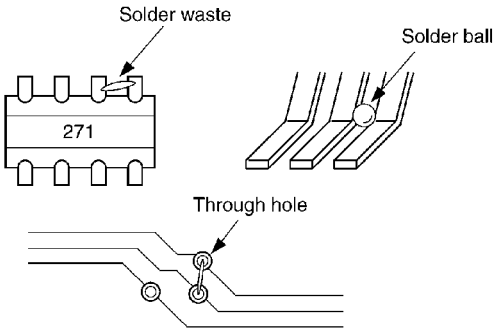

LCD display
CALL SERVICE
This display occurs when the temperature of the thermistor on the terminal head is NG.
Faulty connection of the thermal head connector.
ASIC IC501 pins 2 and 137or the thermistor on the thermal head is NG.

2.3.6.2. NG EXAMPLE

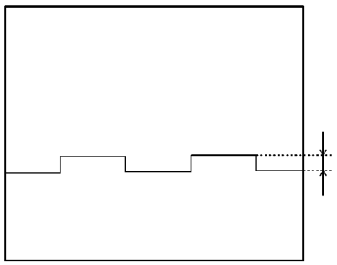
1.



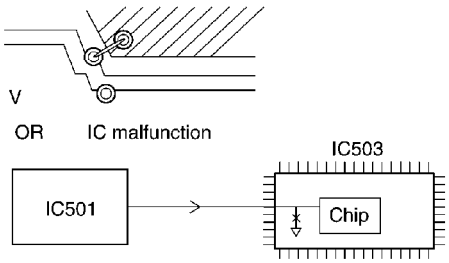
Short circuit from the adjacent signal wires.
Check for a short circuit in the RA and IC leads and the signal wire at the through hole.



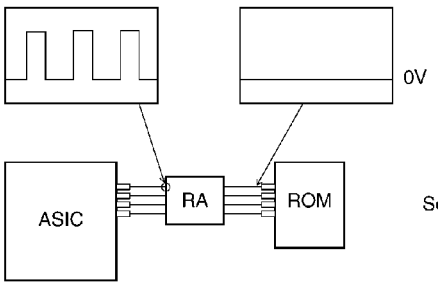
2.



Short between the signal line and GND.



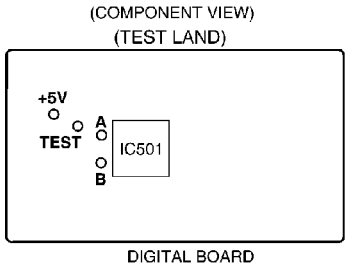
3.

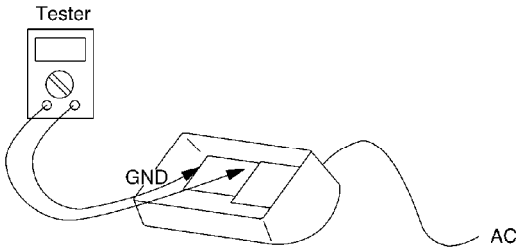


Solder fault on RA.

2.3.6.3. CHECK THE STATUS OF THE DIGITAL BOARD

Please check the status (voltage) of test lands **A** and **B**.
The result may tell you a defective point.





- Turn off the power supply.
- Short using a metallic object, such as tweezers, between the **TEST** point and **+5V** land, and turn on the AC power for a few seconds. And then remove a metallic object.
- Check the following voltages using an oscilloscope or tester.
- To cancel the status check mode, turn off the AC power.

Defective point	Check point voltage		Check items
	A	B	
RTC (IC501)	0V	0V	IC501(RTC is included in IC501)
DRAM (IC503)	0V	5V	IC503(8,23 pin), R549, R551, R631, IC501(64, 65 pin), L507
MODEM (IC505)	5V	0V	IC501(61 pin), IC505(53~55 pin), R599, L508, C552, R561, R554, RA504, RA505
ALL OK	5V	5V	

- This indicates that the Add/Data Bus, RAM, ROM, MODEM, and ASIC are all connected to the ASIC properly and that control from the ASIC is possible.

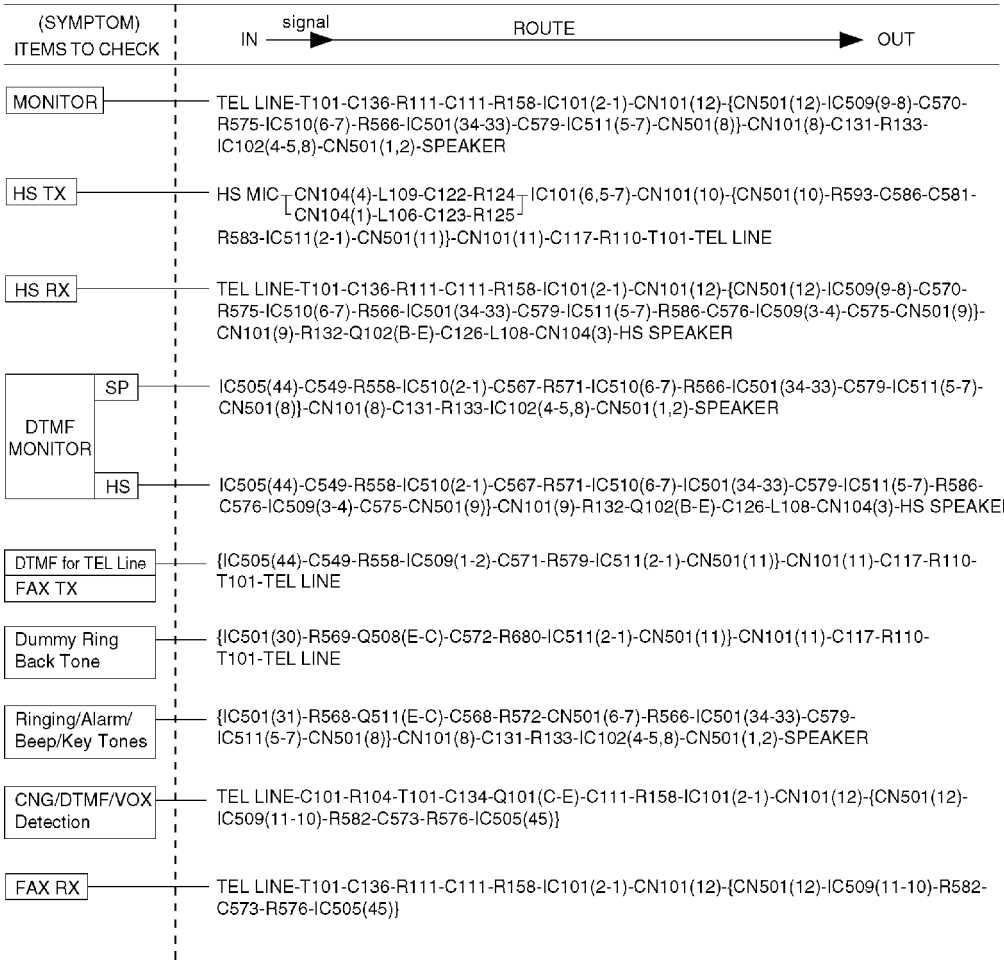
Please check the soldering and conduction of these components.
If there is no problem, replace the ICs.

If you still have a problem with the digital board, please refer to **NG wave pattern**.

2.3.7. ANALOG BOARD SECTION

This chapter provides the testing procedures required for the analog parts. A signal route to be tested is determined depending upon purposes. For example, the handset TX route begins at the handset microphone and the signal is output to the telephone line. The signal mainly flowing on this route is analog. You can trace the signal with an oscilloscope. The signal flow on each route is shown in the Check Sheet here. If you find a specific problem in the unit, for example if you cannot communicate with the H/S, trace that signal route locally with the following Check Sheet and locate the faulty point.

2.3.7.1. CHECK SHEET

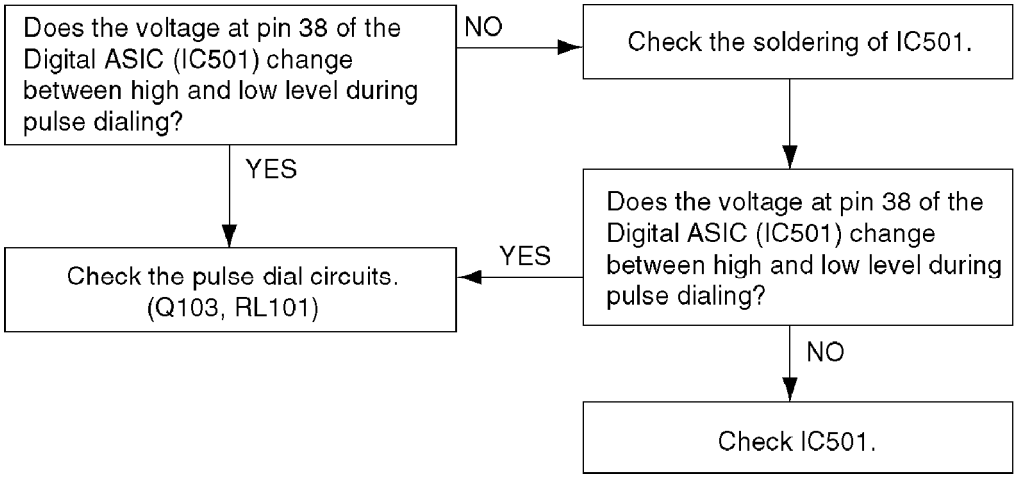


Note:
{ }: Inside the digital board

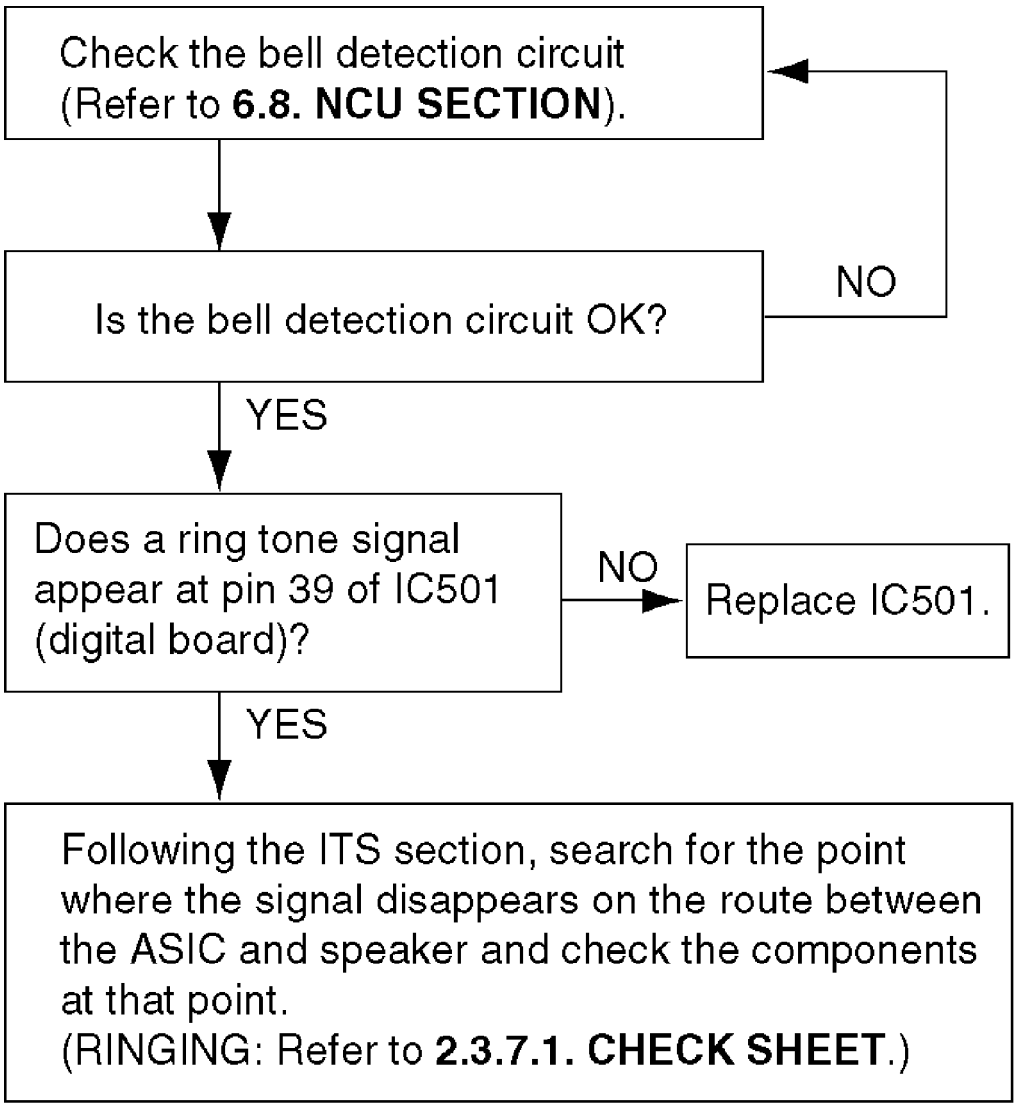
2.3.7.2. DEFECTIVE ITS (Integrated Telephone System) SECTION

1. No handset and speakerphone transmission / reception
Perform a signal test in the ITS or the NCU section and locate a defective point (where the signal disappears) on each route between the handset microphone and telephone line (sending), or between the telephone line and the handset speaker (receiving), or between the microphone and the telephone line (sending), or between the telephone line and the speaker (receiving). Check the components at that point. 2.3.7.1. CHECK SHEET() is useful for this investigation.

2. No pulse dialing

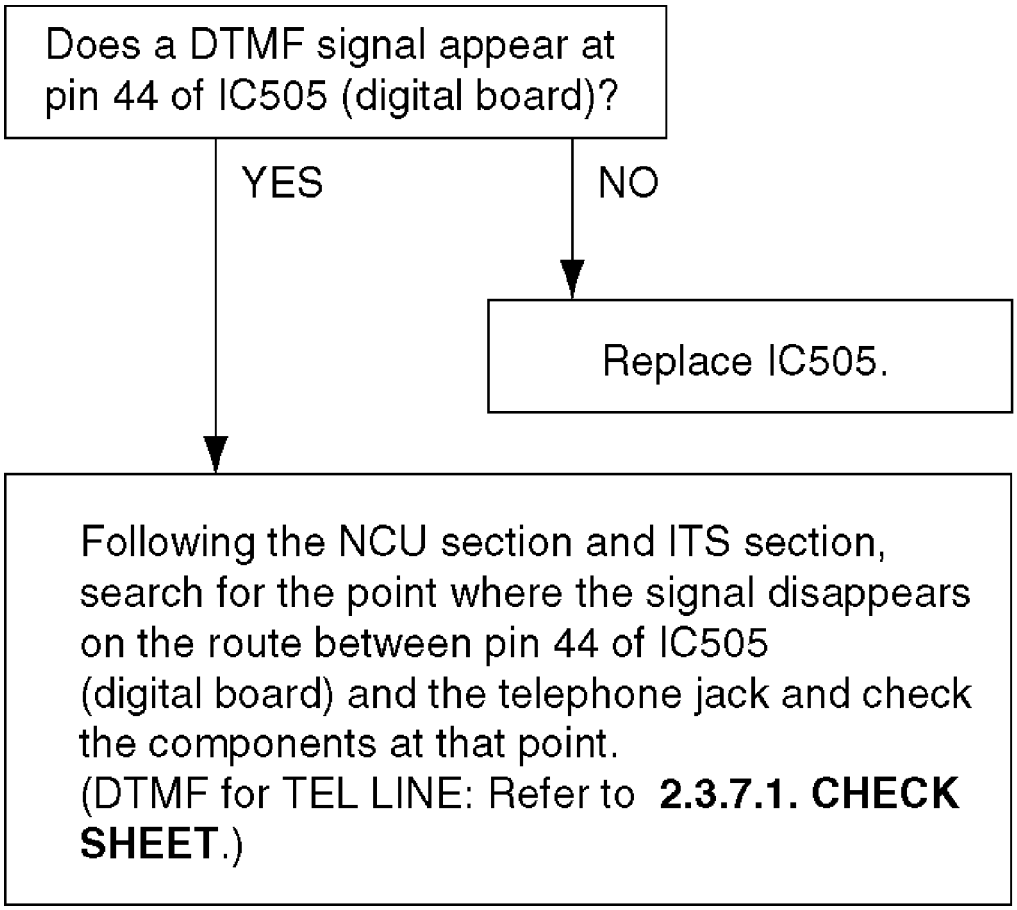

Does the voltage at pin 38 of the Digital ASIC (IC501) change between high and low level during pulse dialing?
NO
Check the soldering of IC501.
YES
Does the voltage at pin 38 of the Digital ASIC (IC501) change between high and low level during pulse dialing?
YES
Check the pulse dial circuits. (Q103, RL101)
NO
Check IC501.

3. No ring tone (or No bell)


Check the bell detection circuit (Refer to 6.8. NCU SECTION).
Is the bell detection circuit OK?
NO
YES
Does a ring tone signal appear at pin 39 of IC501 (digital board)?
NO
Replace IC501.
YES
Following the ITS section, search for the point where the signal disappears on the route between the ASIC and speaker and check the components at that point.
(RINGING: Refer to 2.3.7.1. CHECK SHEET.)

CROSS REFERENCE:
2.3.7.1. CHECK SHEET()

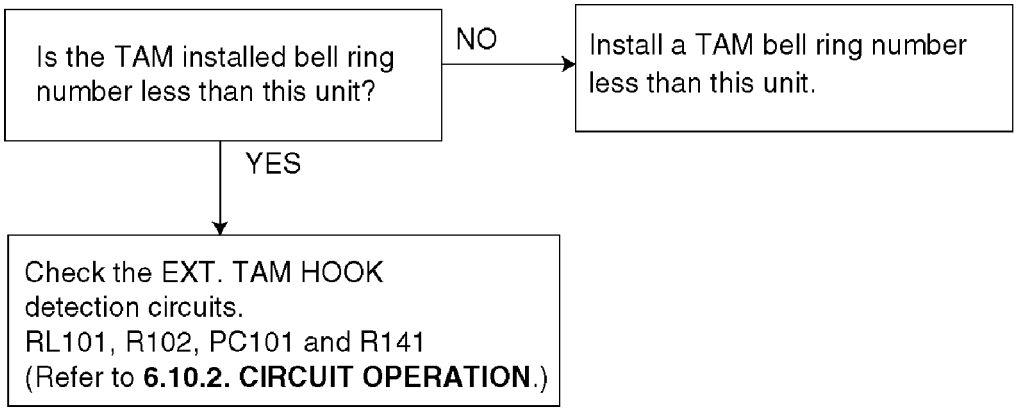
4. No tone dialing


Does a DTMF signal appear at pin 44 of IC505 (digital board)?
YES
NO
Replace IC505.
Following the NCU section and ITS section, search for the point where the signal disappears on the route between pin 44 of IC505 (digital board) and the telephone jack and check the components at that point.
(DTMF for TEL LINE: Refer to 2.3.7.1. CHECK SHEET.)

CROSS REFERENCE:
2.3.7.1. CHECK SHEET()

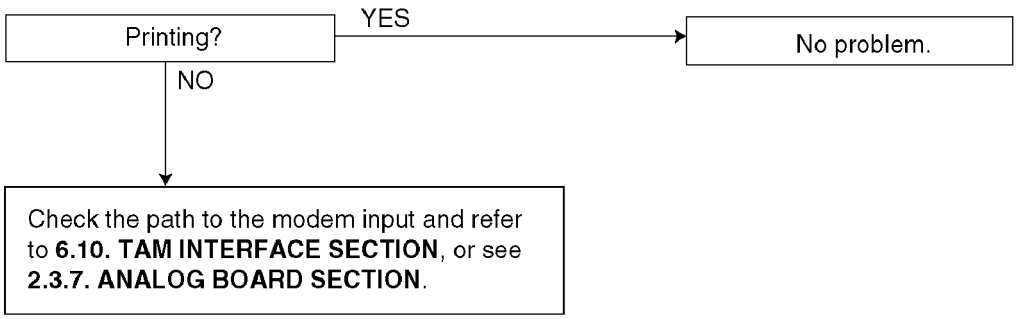
2.3.7.3. DETECTIVE TAM INTERFACE SECTION

1. The FAX turns on, but does not arrive through TAM.


Is the TAM installed bell ring number less than this unit?
NO
Install a TAM bell ring number less than this unit.
YES
Check the EXT. TAM HOOK detection circuits.
RL101, R102, PC101 and R141
(Refer to 6.10.2. CIRCUIT OPERATION.)

CROSS REFERENCE:
6.10.2. CIRCUIT OPERATION()

2. A FAX is received, but won't switch from TAM to FAX.


Printing?
YES
No problem.
NO
Check the path to the modem input and refer to 6.10. TAM INTERFACE SECTION, or see 2.3.7. ANALOG BOARD SECTION.

CROSS REFERENCE:
2.3.7. ANALOG BOARD SECTION()
6.10. TAM INTERFACE SECTION()

2.3.8. POWER SUPPLY BOARD SECTION

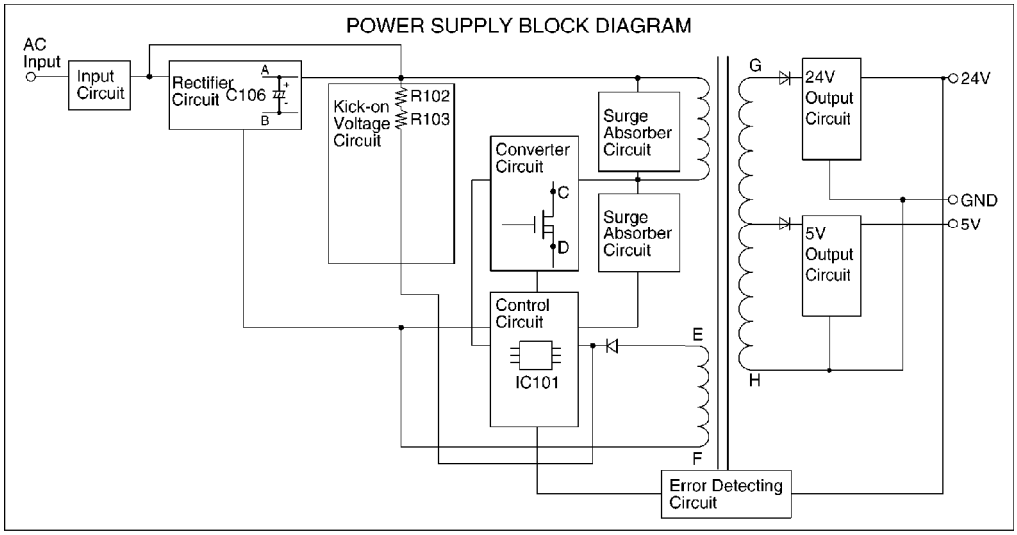
2.3.8.1. KEY COMPONENTS FOR TROUBLESHOOTING

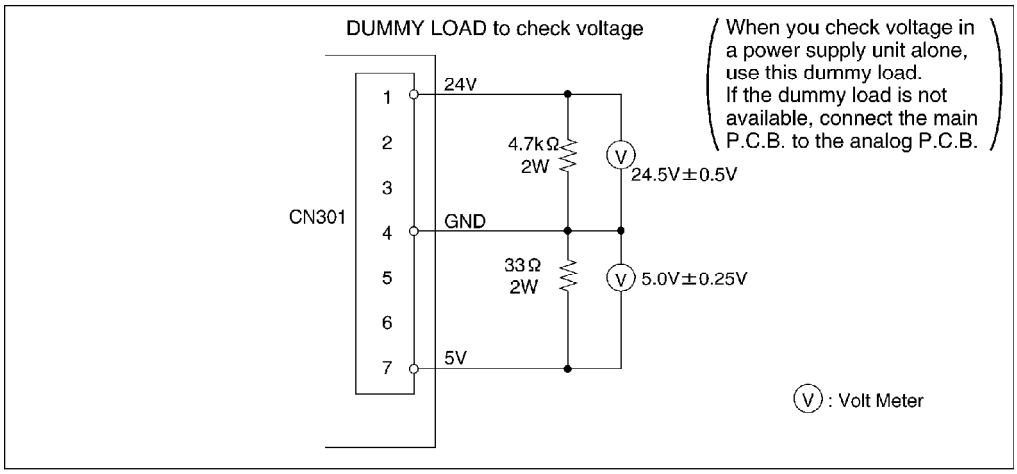
Check the following parts first: F101, D101-D104, C106, Q101, PC101 and IC101.
This comes from our experience with experimental tests. For example: power supply and lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

Caution:

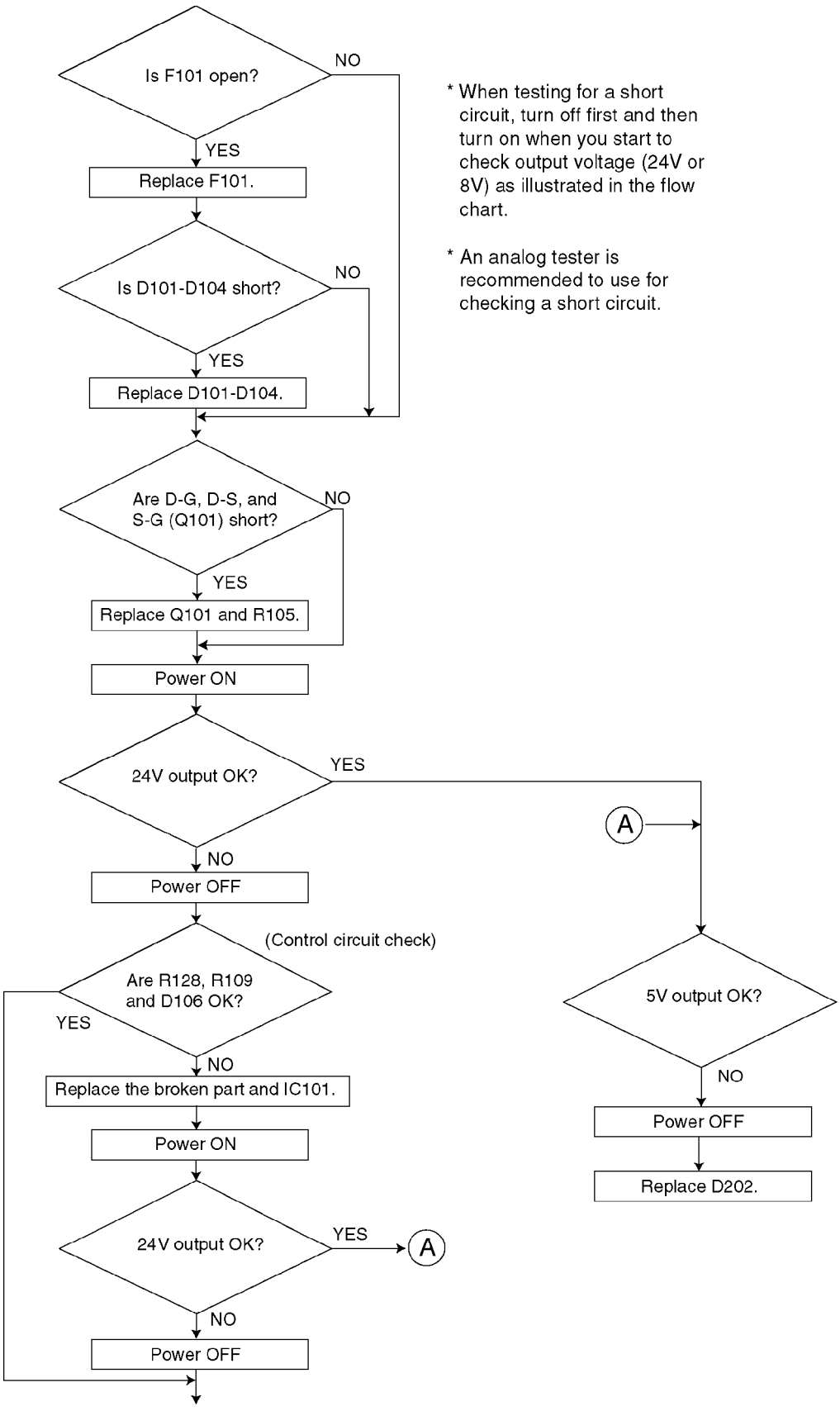
If you find a melted fuse in the unit, do not turn on the power until you locate and repair the faulty parts (except for the fuse); otherwise the fuse will melt again and you cannot pinpoint the faulty point.

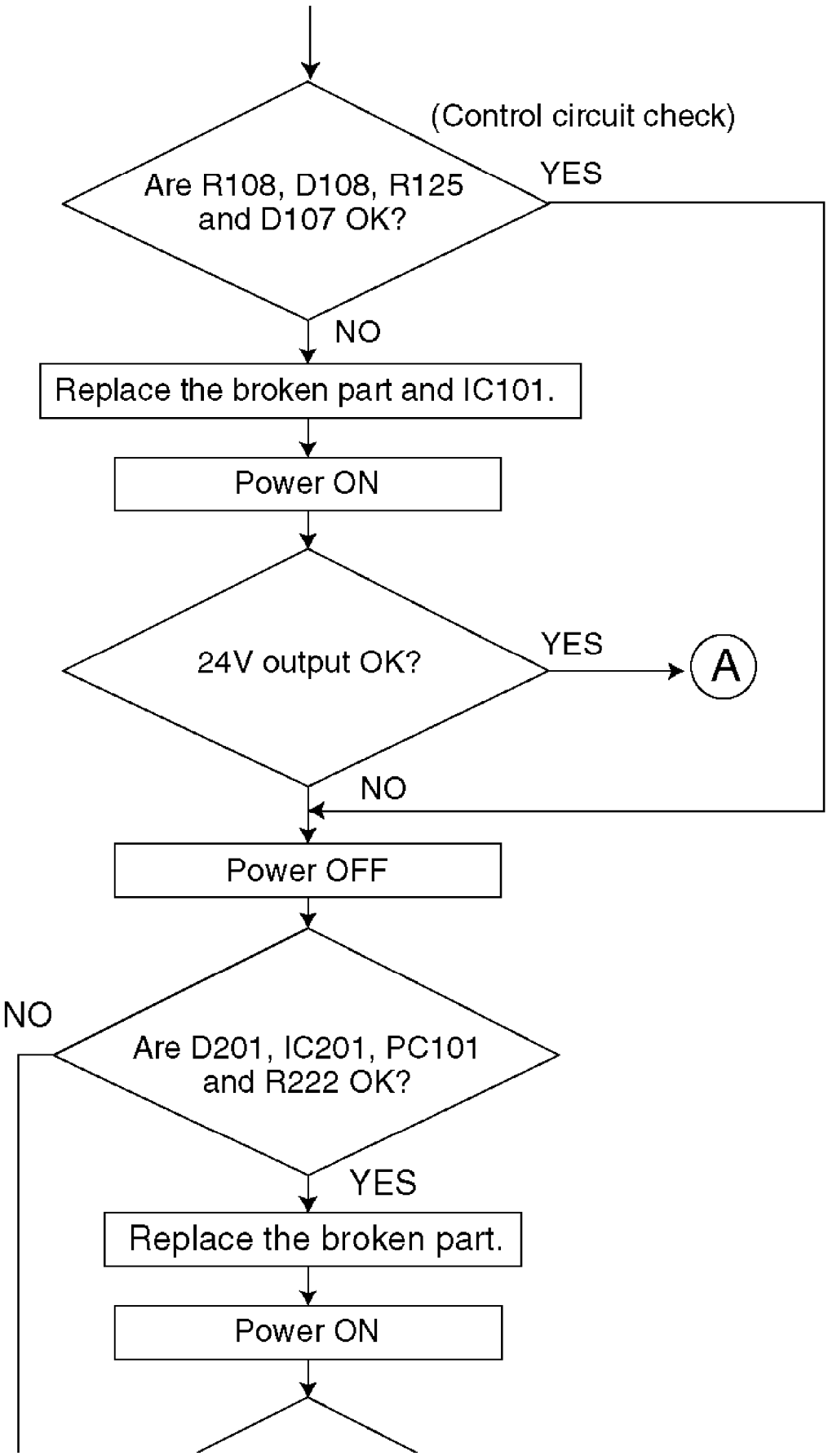
In most cases, the symptom is that nothing is output. It is more likely that the fault is in the primary side rather than the secondary side. Check the primary side first.

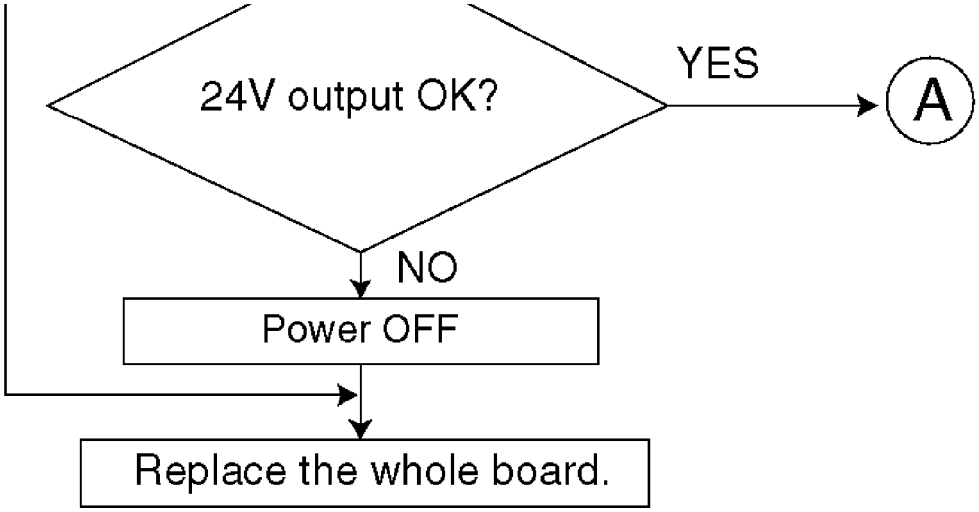




2.3.8.2. TOROUBLESHOOTING FLOW CHART


Is F101 open?
NO
YES
Replace F101.
Is D101-D104 short?
NO
YES
Replace D101-D104.
Are D-G, D-S, and S-G (Q101) short?
NO
YES
Replace Q101 and R105.
Power ON
24V output OK?
YES
NO
Power OFF
(Control circuit check)
Are R128, R109 and D106 OK?
YES
NO
Replace the broken part and IC101.
Power ON
24V output OK?
YES
A
NO
Power OFF
A
5V output OK?
NO
Power OFF
Replace D202.
* When testing for a short circuit, turn off first and then turn on when you start to check output voltage (24V or 8V) as illustrated in the flow chart.
* An analog tester is recommended to use for checking a short circuit.


(Control circuit check)
Are R108, D108, R125 and D107 OK?
YES
NO
Replace the broken part and IC101.
Power ON
24V output OK?
YES
A
NO
Power OFF
NO
Are D201, IC201, PC101 and R222 OK?
YES
Replace the broken part.
Power ON



2.3.8.3. BROKEN PARTS REPAIR DETAILS

(D101, D102, D103, D104)

Check for a short-circuit in terminal 4. If D101, D102, D103 and D104 are short-circuits, F101 will melt (open).

In this case, replace all of the parts (D101, D102, D103, D104, F101).

(Q101)

The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q101.

This is due to a very high voltage through the Gate circuit which is composed of R128, R109, D106 and IC101.

You should change all of the parts listed as follows.

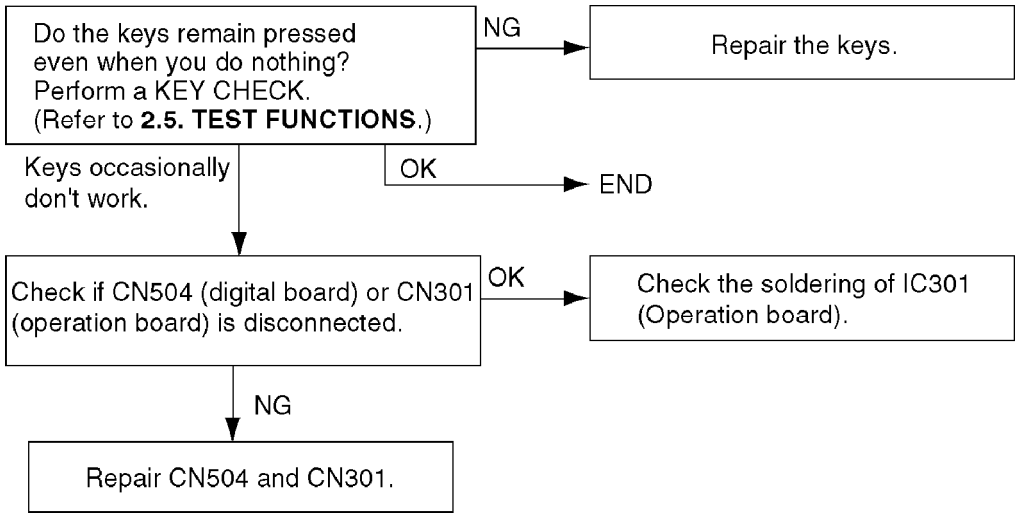
F101, Q101, R128, R109, D106, IC101

(D201)

If D201 is broken, the oscillation circuit in the power supply cannot operate. Check it with an electric tester.

2.3.9. OPERATION PANEL SECTION

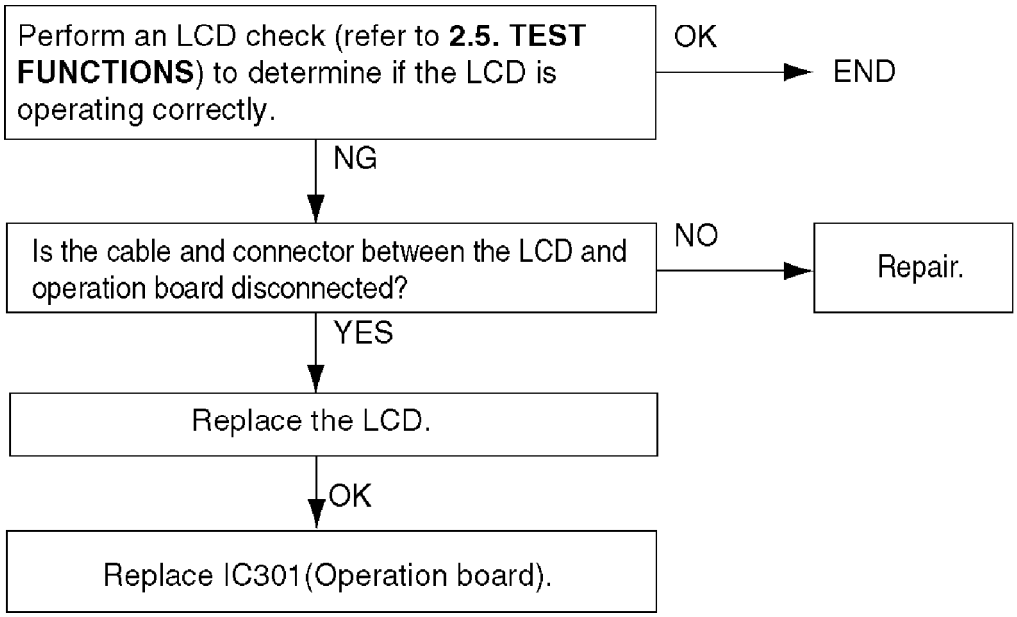
2.3.9.1. NO KEY OPERATION


Do the keys remain pressed even when you do nothing? Perform a KEY CHECK. (Refer to 2.5. TEST FUNCTIONS.)
NG
Repair the keys.
Keys occasionally don't work.
OK
END
Check if CN504 (digital board) or CN301 (operation board) is disconnected.
OK
Check the soldering of IC301 (Operation board).
NG
Repair CN504 and CN301.

CROSS REFERENCE:

2.5. TEST FUNCTIONS()

2.3.9.2. NO LCD INDICATION

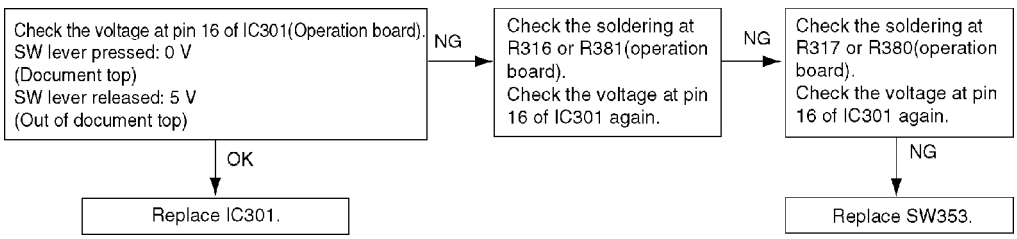


CROSS REFERENCE:
2.5. TEST FUNCTIONS()

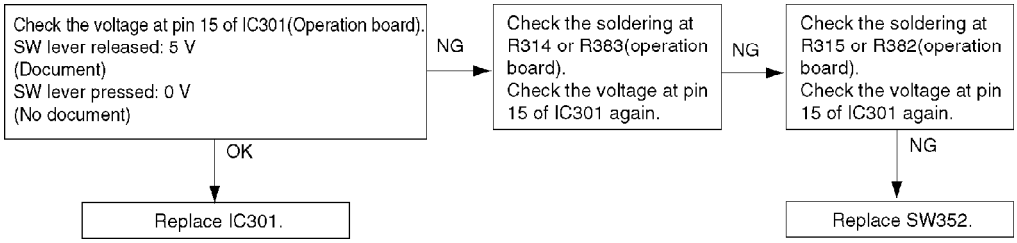
2.3.10. SENSOR SECTION

Refer to 6.5. SENSORS AND SWITCHES() for the circuit descriptions.
The Test Function makes the sensor circuit check easier. (Refer to 2.5. TEST FUNCTIONS().) / For example, as for "COVER OPEN SENSOR", "CO" is turned ON/OFF on the display when you open or close the front cover. Also, document sensor, read position sensor, recording paper sensor and jam sensor are turned ON/OFF by the copy operation. Therefore, each sensor can be checked for proper mechanical operation. / As for the electric check, check whether each voltage is right or not with following flowchart turning each sensor lever ON/OFF manually.

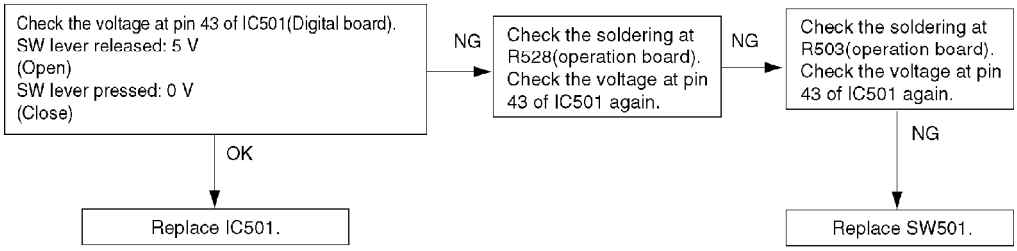
2.3.10.1. CHECK THE DOCUMENT TOP SW (SW353)....."REMOVE DOCUMENT"


Check the voltage at pin 16 of IC301(Operation board).
SW lever pressed: 0 V
(Document top)
SW lever released: 5 V
(Out of document top)
NG
Check the soldering at R316 or R381(operation board).
Check the voltage at pin 16 of IC301 again.
NG
Check the soldering at R317 or R380(operation board).
Check the voltage at pin 16 of IC301 again.
OK
NG
Replace IC301.
Replace SW353.

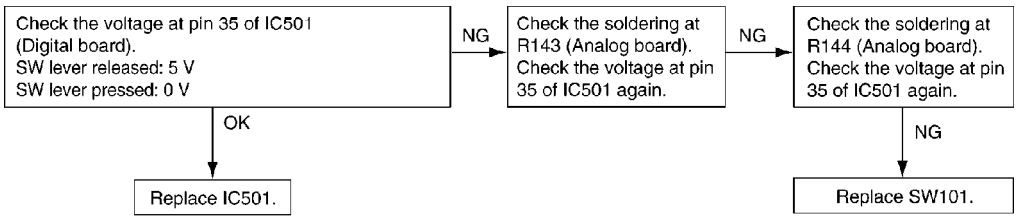
2.3.10.2. CHECK THE DOCUMENT SET SW (SW352)....."CHECK DOCUMENT"


Check the voltage at pin 15 of IC301(Operation board).
SW lever released: 5 V
(Document)
SW lever pressed: 0 V
(No document)
NG
Check the soldering at R314 or R383(operation board).
Check the voltage at pin 15 of IC301 again.
NG
Check the soldering at R315 or R382(operation board).
Check the voltage at pin 15 of IC301 again.
NG
Replace SW352.
OK
Replace IC301.

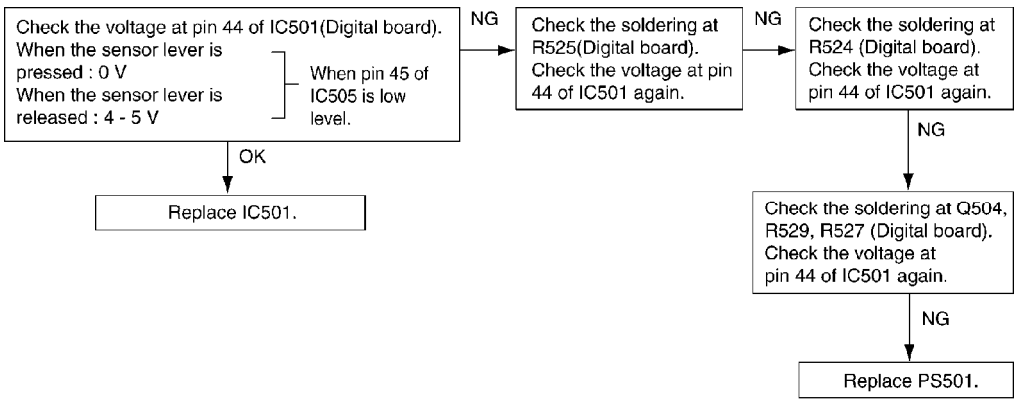
2.3.10.3. CHECK THE COVER OPEN AND THE FILM END SW (SW501)....."COVER OPEN " or "CHECK FILM"



2.3.10.4. CHECK THE HOOK SWITCH (SW101)

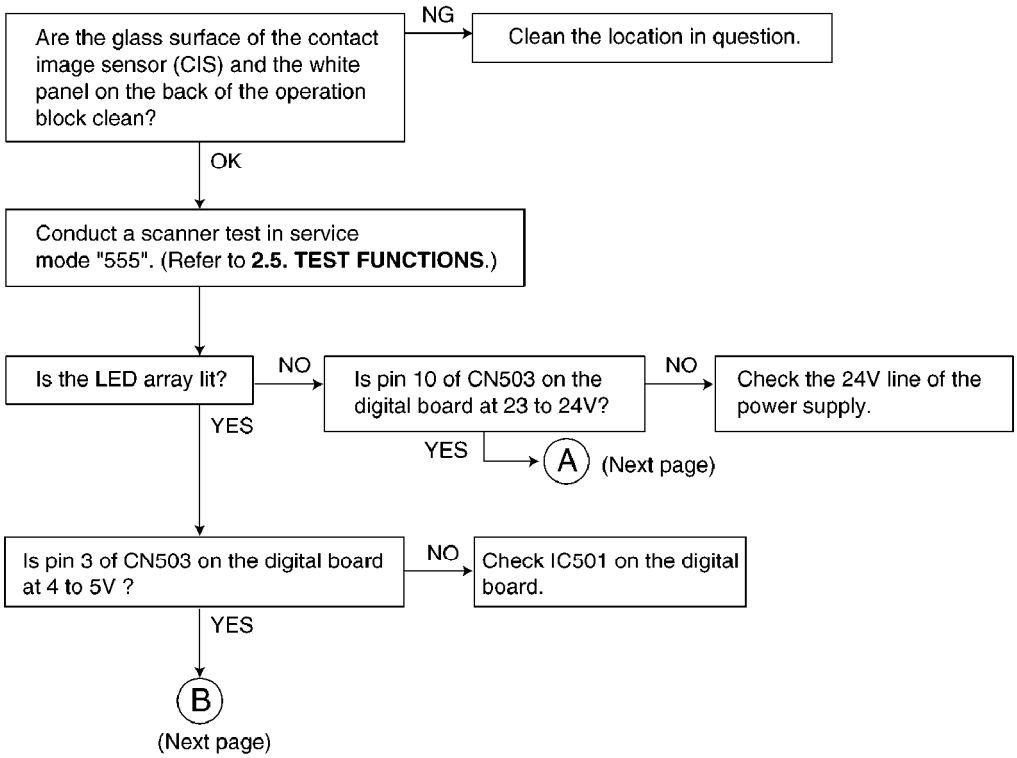

Check the voltage at pin 35 of IC501 (Digital board).
SW lever released: 5 V
SW lever pressed: 0 V
NG
Check the soldering at R143 (Analog board).
Check the voltage at pin 35 of IC501 again.
NG
Check the soldering at R144 (Analog board).
Check the voltage at pin 35 of IC501 again.
NG
Replace SW101.
OK
Replace IC501.

2.3.10.5. CHECK THE PAPER TOP SENSER (PS501)....."PAPER JAMMED"


Check the voltage at pin 44 of IC501(Digital board).
When the sensor lever is pressed : 0 V
When the sensor lever is released : 4 - 5 V
When pin 45 of IC505 is low level.
NG
Check the soldering at R525(Digital board).
Check the voltage at pin 44 of IC501 again.
NG
Check the soldering at R524 (Digital board).
Check the voltage at pin 44 of IC501 again.
NG
Check the soldering at Q504, R529, R527 (Digital board).
Check the voltage at pin 44 of IC501 again.
NG
Replace PS501.
OK
Replace IC501.

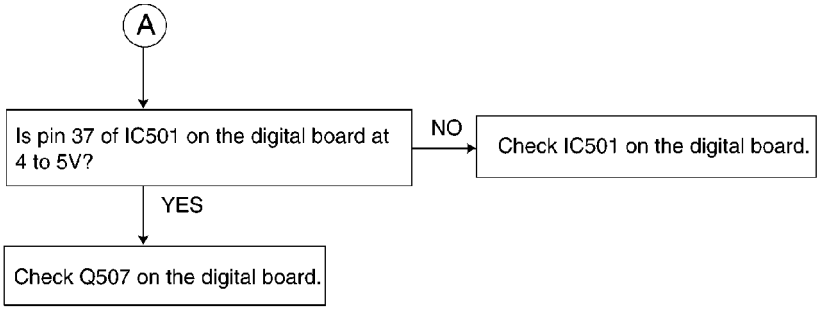
2.3.11. CIS (Contact Image Sensor) SECTION

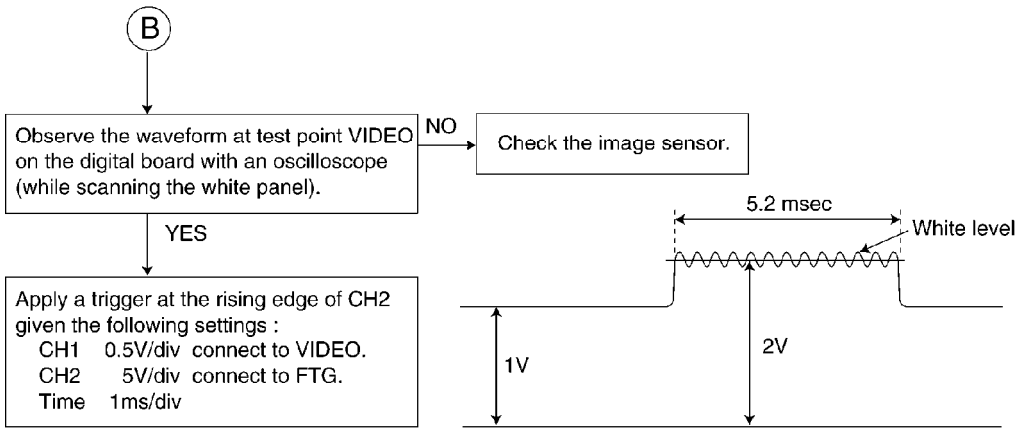
Refer to 6.4.4. SCANNING BLOCK().

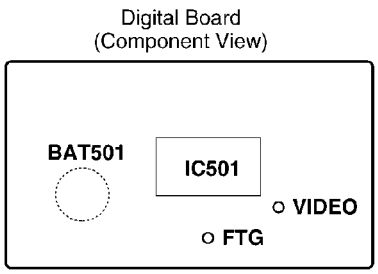

Are the glass surface of the contact image sensor (CIS) and the white panel on the back of the operation block clean?
NG
Clean the location in question.
OK
Conduct a scanner test in service mode "555". (Refer to 2.5. TEST FUNCTIONS.)
Is the LED array lit?
NO
Is pin 10 of CN503 on the digital board at 23 to 24V?
NO
Check the 24V line of the power supply.
YES
YES
A
(Next page)
Is pin 3 of CN503 on the digital board at 4 to 5V ?
NO
Check IC501 on the digital board.
YES
B
(Next page)

CROSS REFERENCE:

2.5. TEST FUNCTIONS()

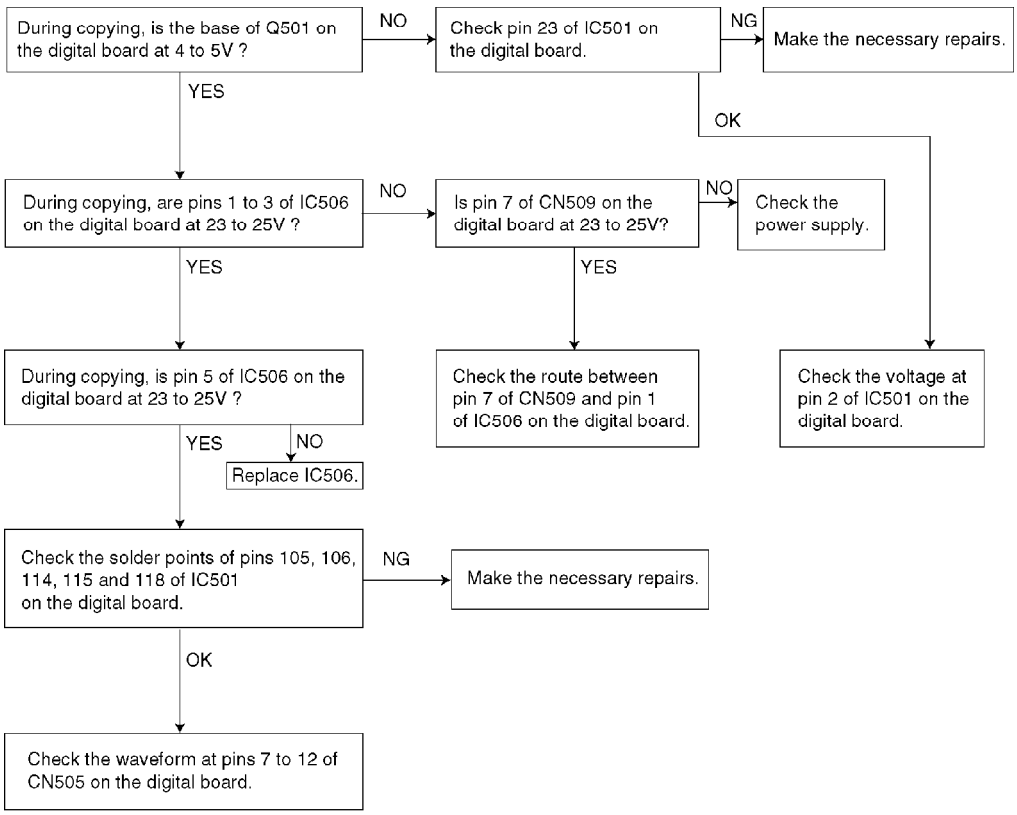



B
Observe the waveform at test point VIDEO on the digital board with an oscilloscope (while scanning the white panel).
NO
Check the image sensor.
YES
Apply a trigger at the rising edge of CH2 given the following settings :
CH1 0.5V/div connect to VIDEO.
CH2 5V/div connect to FTG.
Time 1ms/div
5.2 msec
White level
1V
2V



2.3.12. THERMAL HEAD SECTION

Refer to 6.4.3. THERMAL HEAD().


During copying, is the base of Q501 on the digital board at 4 to 5V ?
NO
Check pin 23 of IC501 on the digital board.
NG
Make the necessary repairs.
YES
OK
During copying, are pins 1 to 3 of IC506 on the digital board at 23 to 25V ?
NO
Is pin 7 of CN509 on the digital board at 23 to 25V?
NO
Check the power supply.
YES
YES
During copying, is pin 5 of IC506 on the digital board at 23 to 25V ?
Check the route between pin 7 of CN509 and pin 1 of IC506 on the digital board.
Check the voltage at pin 2 of IC501 on the digital board.
YES
NO
Replace IC506.
Check the solder points of pins 105, 106, 114, 115 and 118 of IC501 on the digital board.
NG
Make the necessary repairs.
OK
Check the waveform at pins 7 to 12 of CN505 on the digital board.

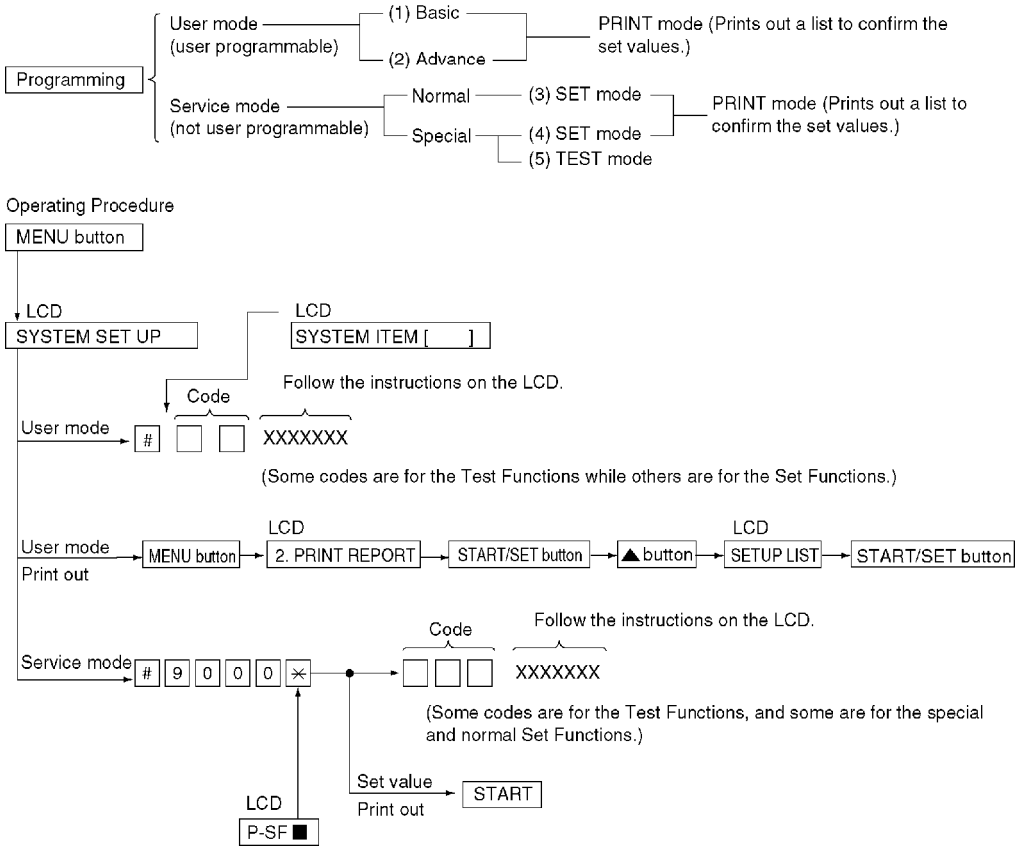
2.4. PROGRAMMING AND LISTS

The programming functions are used to program the various features and functions of the machine, and to test the machine.
This facilitates communication between the user and the service man while programming the unit.

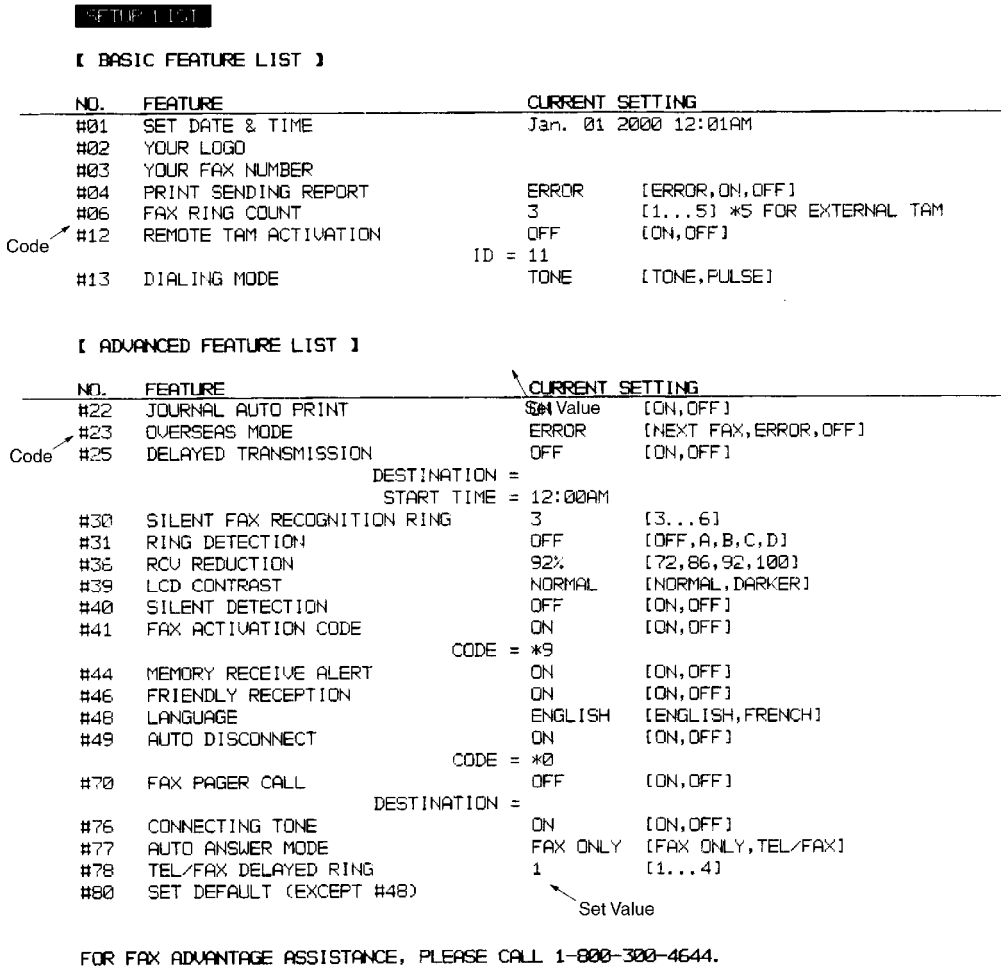
2.4.1. OPERATION

There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and are available to the user. The special programs are only those listed here and not displayed to the user. In both the User and Service Modes, there are Set Functions and Test Functions. The Set Functions are used to program various features and functions, and the Test Functions are used to test the various functions. The Set Functions are accessed by entering their code, changing the appropriate value, then pressing the SET key. The Test Functions are accessed by entering their code and pressing the key listed on the menu. While programming, to cancel any entry, press the STOP key.

2.4.2. OPERATION FLOW



2.4.3. USER MODE (The list below is an example of the SYSTEM SETUP LIST the unit prints out.)



SETUP LIST

[BASIC FEATURE LIST]

NO.	FEATURE	CURRENT SETTING	
#01	SET DATE & TIME	Jan. 01 2000 12:01AM	
#02	YOUR LOGO		
#03	YOUR FAX NUMBER		
#04	PRINT SENDING REPORT	ERROR	[ERROR,ON,OFF]
#06	FAX RING COUNT	3	[1...5] *5 FOR EXTERNAL TAM
#12	REMOTE TAM ACTIVATION	OFF	[ON,OFF]
	ID =	11	
#13	DIALING MODE	TONE	[TONE,PULSE]

Code

[ADVANCED FEATURE LIST]

NO.	FEATURE	CURRENT SETTING	
#22	JOURNAL AUTO PRINT	ON	[ON,OFF]
#23	OVERSEAS MODE	ERROR	[NEXT FAX,ERROR,OFF]
#25	DELAYED TRANSMISSION	OFF	[ON,OFF]
	DESTINATION =		
	START TIME =	12:00AM	
#30	SILENT FAX RECOGNITION RING	3	[3...6]
#31	RING DETECTION	OFF	[OFF,A,B,C,D]
#36	RCV REDUCTION	92%	[72,86,92,100]
#39	LCD CONTRAST	NORMAL	[NORMAL,DARKER]
#40	SILENT DETECTION	OFF	[ON,OFF]
#41	FAX ACTIVATION CODE	ON	[ON,OFF]
	CODE =	*9	
#44	MEMORY RECEIVE ALERT	ON	[ON,OFF]
#46	FRIENDLY RECEPTION	ON	[ON,OFF]
#48	LANGUAGE	ENGLISH	[ENGLISH,FRENCH]
#49	AUTO DISCONNECT	ON	[ON,OFF]
	CODE =	*0	
#70	FAX PAGER CALL	OFF	[ON,OFF]
	DESTINATION =		
#76	CONNECTING TONE	ON	[ON,OFF]
#77	AUTO ANSWER MODE	FAX ONLY	[FAX ONLY,TEL/FAX]
#78	TEL/FAX DELAYED RING	1	[1...4]
#80	SET DEFAULT (EXCEPT #48)		

Code

Set Value

FOR FAX ADVANTAGE ASSISTANCE, PLEASE CALL 1-800-300-4644.

Note:
The above values are the default values.

2.4.4. SERVICE FUNCTION TABLE

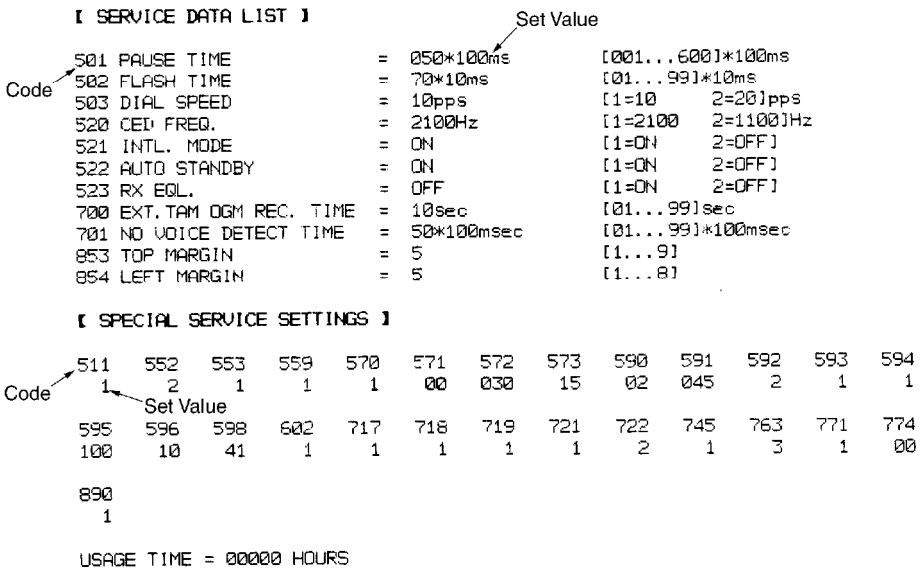
Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time set	X 100 msec	001~600	50	----------
502	Flash time	X 10 ms	01~99	70	----------
503	Dial speed select	1:10 pps 2: 20 pps	1, 2	1	----------
511	VOX sense	1:High 2: Low	1, 2	1	When the TAM (or EXT TAM) d stop recording the ICM becaus is detected on the telephone li change this setting to "LOW".
520	CED frequency select	1:2100 Hz 2:1100 Hz	1, 2	1	See Symptom/Countermeasur for long distance and internati calls in 2.3.5.1.5. THE UNIT CA COPY, BUT CANNOT EITHER TRANSMIT/RECEIVE LONG DISTANCE OR INTERNATIONL COMMUNICATIONS ().
521	International mode select	1:ON 2: OFF	1, 2	1	See Symptom/Countermeasur for long distance and internati calls in 2.3.5.1.5. THE UNIT CA COPY, BUT CANNOT EITHER TRANSMIT/RECEIVE LONG DISTANCE OR INTERNATIONL COMMUNICATIONS ().
522	Auto standby select	1:ON 2: OFF	1, 2	1	The resolution reverts to the d when transmission is complet
523	Receive equalizer select	1:ON 2: OFF	1, 2	2	When the telephone station is from the unit or reception can performed correctly, adjust accordingly.
550	Memory clear: To reset the value to the default one, except the top margin (853) and left margin (854).				"START" input
551	ROM check				See 2.5. TEST FUNCTIONS().
552	DTMF single tone test	1:ON 2: OFF	1, 2	2	See 2.5. TEST FUNCTIONS().
553	Monitor on FAX communication select	1:OFF 2: PHASE B 3 :ALL	1~3	1	Sets whether to monitor the lin signal with the unit's speaker FAX communication or not.
554	Modem test				See 2.5. TEST FUNCTIONS().
555	Scan check				See 2.5. TEST FUNCTIONS().
556	Motor test			0	See 2.5. TEST FUNCTIONS().
557	LED test				See 2.5. TEST FUNCTIONS().
558	LCD test				See 2.5. TEST FUNCTIONS().
559	Document jam detection select	1:ON 2: OFF	1, 2	1	See 2.2.1. DOCUMENT JAMS()
570	BREAK % select	1:61% 2: 67%	1, 2	1	Sets the % break of pulse diali according PBX.

Code	Function	Set Value	Effective Range	Default	Remarks
571	ITS auto redial time set	X number of times	00~99	0	Selects the number of times th is redialed (not including the f
572	ITS auto redial line disconnection time set	X second	001~999	30	Sets the interval of ITS redialir
573	Remote turn-on ring number set	X number of rings	01~99	15	Sets the number of rings befo unit starts to receive a docum the TEL mode.
590	FAX auto redial time set	X number of times	00~99	2	Selects the number of redial ti during FAX communication (n including the first dial).
591	FAX auto redial time disconnection time set	X second	001~999	45	Sets the FAX redial interval du FAX communication.
592	CNG transmit select	1:OFF / 2: ALL / 3: AUTO	1~3	2	Lets you select the CNG outpu during FAX transmission. ALL is output at phase A. AUTO: C output only when automatic d performed. OFF: CNG id not o phase A. Refer to 2.3.5.1.2. SOMETIME THERE IS A TRANS PROBLEM().
593	Time between CED and 300bps	1:75 msec / 2:500 msec / 3:1 sec	1~3	1	See Symptom/Countermeasur for long distance and internati calls in 2.3.5.1.5. THE UNIT CA COPY, BUT CANNOT EITHER TRANSMIT/RECEIVE LONG DISTANCE OR INTERNATIONL COMMUNICATIONS (). Refer to 2.3.5.1.3. RECEIVE PROBLEM(2.3.5.1.5. THE UNIT CAN COPY CANNOT EITHER TRANSMIT/ RECEIVE LONG DISTANCE OF INTERNATIONL COMMUNICAT
594	Overseas DIS detection select	1:detects at the 1st time / 2: detects at the 2st time	1, 2	1	See Symptom/Countermeasur for long distance and internati calls in 2.3.5.1.5. THE UNIT CA COPY, BUT CANNOT EITHER TRANSMIT/RECEIVE LONG DISTANCE OR INTERNATIONL COMMUNICATIONS (). Refer to 2.3.5.1.2. SOMETIME THERE IS TRANSMIT PROBLEM() and 2.: THE UNIT CAN COPY, BUT CA EITHER TRANSMIT/RECEIVE L DISTANCE OR INTERNATIONL COMMUNICATIONS ().

Code	Function	Set Value	Effective Range	Default	Remarks
595	Receive error limit value set	X Number of times	001~999	100	Sets the number of acceptable lines when the FAX reconstruc received data. Refer to 2.3.5.1. RECEIVE PROBLEM().
596	Transmit level set	X dBm	- 15~00	10	Selects the FAX transmission Refer to 2.3.5.1.2. SOMETIME T IS A TRANSMIT PROBLEM ()ar 2.3.5.1.3. RECEIVE PROBLEM
598	Receiving sensitivity	43= -43 dBm	20~48	41	Used when there is an error pr Refer to 2.3.5.1.5. THE UNIT C COPY, BUT CANNOT EITHER TRANSMIT/RECEIVE LONG DISTANCE OR INTERNATIONL COMMUNICATIONS().
602	Warning LIST Printing	1:ON 2: OFF	1, 2	1	Used to print a caution list wh setting the TEL/FAX mode and detection.
700	EXT.TAM OGM Rec. time	X second	01~99	10	Sets the start time of silent de
701	No voice detect time	X100 msec	01~99	50	Sets the silent call confirmatic detection time.
717	Transmit speed selection	1:9600BPS / 2: 7200BPS / 3:4800BPS / 4: 2400BPS	1~4	1	Adjusts the speed to start trai during FAX transmission. Refe 2.3.5.1.2. SOMETIME THERE IS TRANSMIT PROBLEM ()and 2. THE UNIT CAN COPY, BUT TH TRANSMISSION AND RECEPT IMAGE ARE INCORRECT().
718	Receive speed selection	1:9600BPS / 2: 7200BPS / 3:4800BPS / 4: 2400BPS	1~4	1	Adjusts the speed to start trai during FAX reception. Refer to 2.3.5.1.3. RECEIVE PROBLEM(2.3.5.1.6. THE UNIT CAN COPY THE TRANSMISSION AND RECEPTION IMAGE ARE INCO ().
719	Ringer off in TEL/FAX mode	1:ON 2: OFF	1, 2	1	Selects the ringer switch off w call is received in the TEL/FAX
721	Pause tone detect	1:ON 2: OFF	1, 2	1	Selects the tone detection for in dialing.
722	Redial tone detect	1:ON 2: OFF	1, 2	2	Sets the tone detection mode redialing.
745	Power ON film feed	1:ON 2: OFF	1, 2	1	When the power is turned on, is wound to take up any slack.
763	CNG detect time for friendly reception	1:10 sec / 2 :20 sec / 3: 30 sec	1~3	3	Selects the CNG detection ton friendly reception.

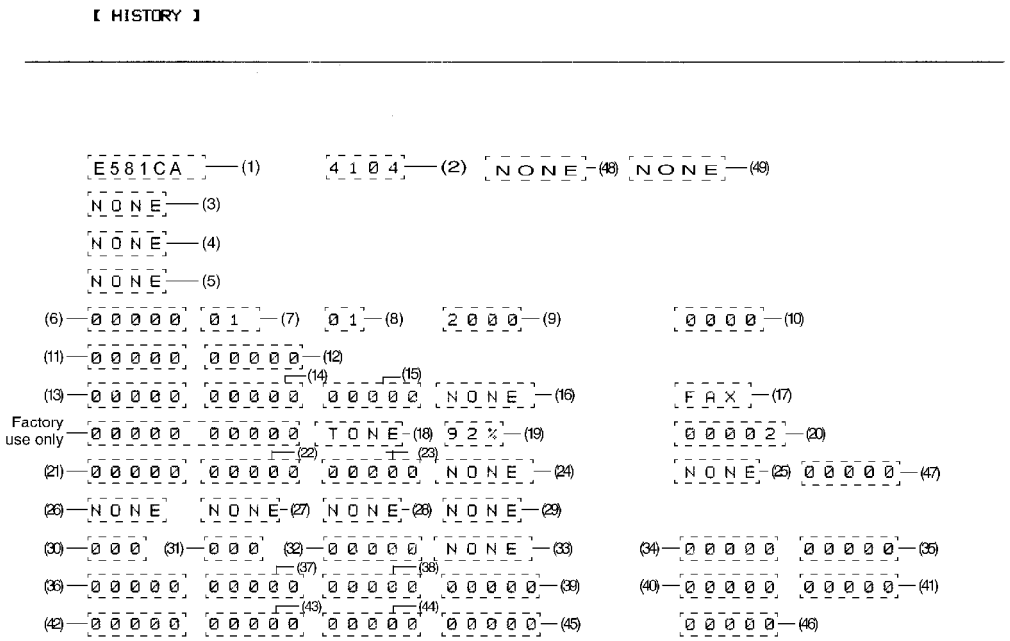
Code	Function	Set Value	Effective Range	Default	Remarks
771	T1 timer	1:35 sec / 2 :60 sec	1, 2	1	Sets a higher value when the response from the other party more time during FAX transmi
774	T4 timer	X 100 msec	00~99	0	Use this function when delay in the line and communication Mobile comm) does not work
815	Sensor & Vox check				See 2.5. TEST FUNCTIONS().
852	Print test pattern				See 2.5. TEST FUNCTIONS().
853	Top margin		1~9	5	----------
854	Left margin		1~8	5	----------
880	History list				See 2.4.6. HISTORY().
881	Journal 2 list				See 2.4.7.3. PRINTOUT EXAMP
882	Journal 3 list				See 2.4.7.3. PRINTOUT EXAMP
890	TEL/FAX 1st ring back tone	1:ON 2: OFF	1, 2	1	Selects whether the TEL/FAX back tone is ON or OFF in the FAX mode.

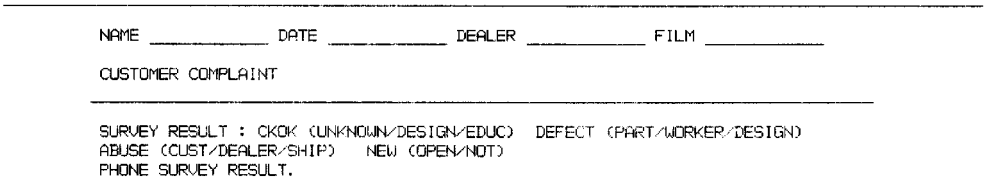
2.4.5. SERVICE MODE SETTINGS (Example of a printed out list)


[SERVICE DATA LIST]
Set Value
Code
501 PAUSE TIME = 050*100ms [001...600]*100ms
502 FLASH TIME = 70*10ms [01...99]*10ms
503 DIAL SPEED = 10pps [1=10 2=20]pps
520 CED FREQ. = 2100Hz [1=2100 2=1100]Hz
521 INTL. MODE = ON [1=ON 2=OFF]
522 AUTO STANDBY = ON [1=ON 2=OFF]
523 RX EQL. = OFF [1=ON 2=OFF]
700 EXT.TAM OGM REC. TIME = 10sec [01...99]sec
701 NO VOICE DETECT TIME = 50*100msec [01...99]*100msec
853 TOP MARGIN = 5 [1...9]
854 LEFT MARGIN = 5 [1...8]
[SPECIAL SERVICE SETTINGS]
Code
511 552 553 559 570 571 572 573 590 591 592 593 594
1 2 1 1 1 00 030 15 02 045 2 1 1
Set Value
595 596 598 602 717 718 719 721 722 745 763 771 774
100 10 41 1 1 1 1 1 2 1 3 1 00
890
1
USAGE TIME = 00000 HOURS

Note:
The above values are the default values.

2.4.6. HISTORY




NAME _____ DATE _____ DEALER _____ FILM _____
CUSTOMER COMPLAINT
SURVEY RESULT : CKOK (UNKNOWN/DESIGN/EDUC) DEFECT (PART/WORKER/DESIGN)
ABUSE (CUST/DEALER/SHIP) NEW (OPEN/NOT)
PHONE SURVEY RESULT.

Note:
See the following descriptions of this report. Item No. (1) ~ (49) are corresponding to the listed items in 2.4.6.1. DESCRIPTIONS OF THE HISTORY REPORT().

2.4.6.1. DESCRIPTIONS OF THE HISTORY REPORT

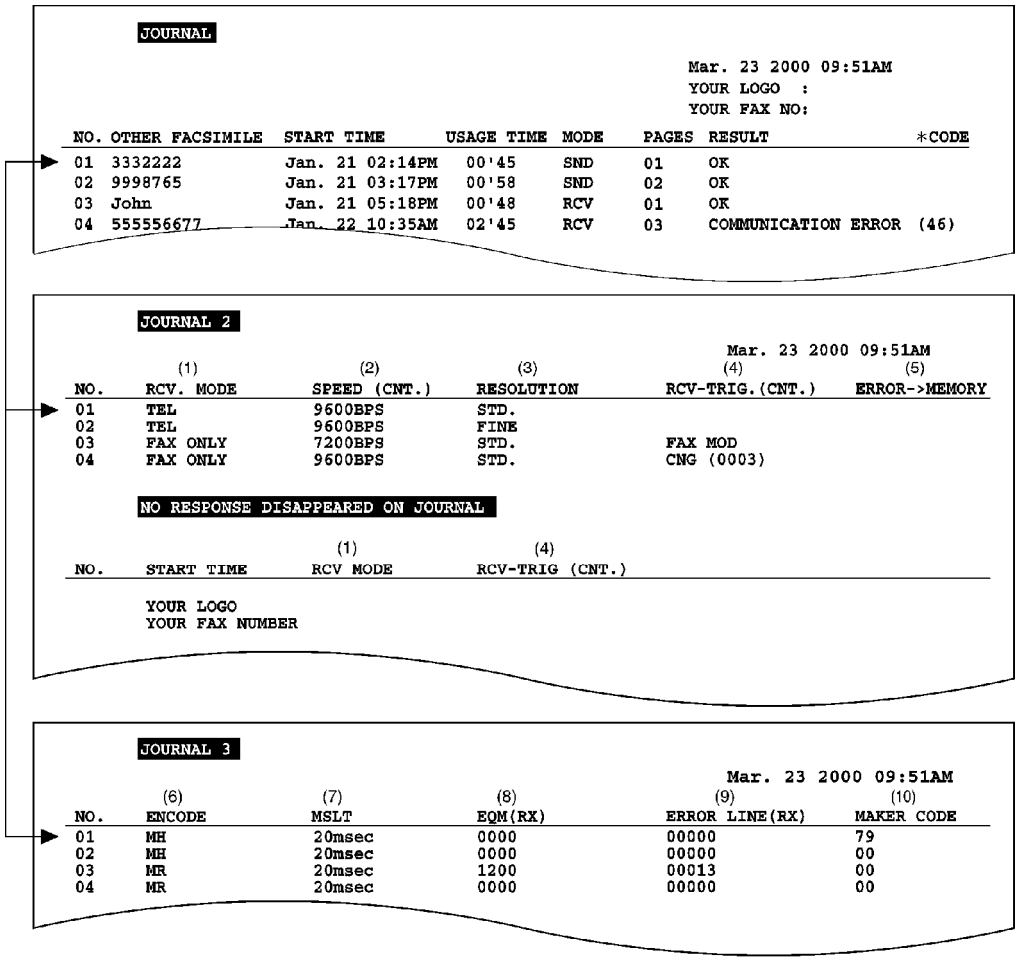
(1) ROM VERSION
EPROM version
(2) SUM
EPROM internal data calculation.
(3) YOUR LOGO
The user logo recorded in the unit. If it is not recorded, NONE will be displayed.

(4) YOUR TELEPHONE NUMBER
The user telephone number recorded in the unit. If it is not recorded, NONE will be displayed.
(5) FAX PAGER NUMBER
If you program a pager number into the unit, the pager number will be displayed here.
(6) FACTORY - CUSTOMER
This shows how many days from factory production until the user turns ON the unit.
(7) MONTH
The shows the very first month, date, year and time set by the user after they purchased the unit.
(8) DAY
The shows the very first month, date, year and time set by the user after they purchased the unit.
(9) YEAR
The shows the very first month, date, year and time set by the user after they purchased the unit.
(10) TIME
The shows the very first month, date, year and time set by the user after they purchased the unit.
(11) USAGE TIME
The amount of time the unit has been powered ON.
(12) FACTORY - NOW
This shows how many days from factory production until the user prints out this history list.
(13) TEL MODE
The amount of time the TEL mode setting was used.
(14) FAX MODE
The amount of time the FAX mode setting was used.
(15) TEL/FAX MODE
The amount of time the TEL/FAX mode setting was used.
(16) ANS/FAX MODE
The amount of time the ANS/FAX mode setting was used.
(17) FINAL RECEIVE MODE
The last set receiving mode by the user.
(18) TONE/PULSE SELECTION
The most recently used setting used, either TONE or PULSE.
(19) RECEIVE REDUCTION
The compression rate when receiving.
(20) SETTING NO. OF DIRECTORY
The recorded directory stations (one touch and JOG DIAL).
(21) NUMBER OF COPY
The number of pages copied.
(22) NUMBER OF RECEIVE
The number of pages received.
(23) NUMBER OF SENDING
The number of pages sent.
(24) NUMBER OF CALLER ID
The number of times Caller ID was received.
(25) NUM(BER OF RECORDING MESSAGE
The number of messages recorded in TAM.
(26) NUMBER OF PC SCAN
The number of times multifunction was used for the Scanner. (The number of pages scanned. If the unit does not have a PC interface, NONE will be printed.)
(27) NUMBER OF PC-PRINT
The number of times multifunction was used for the Printer. (The number of pages printed. If the unit does not have a PC interface, NONE will be printed.)

(28) NUMBER OF RECEIVING TO PC
The number of times received in the PC through the FAX serial interface (RS232C). (The number of pages received. If the unit does not have a PC interface, NONE will be printed.)
(29) NUMBER OF SENDING FROM PC
The number of times transmitted from the PC through the FAX serial interface (RS232C). (The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)
(30) NUMBER OF PRINTING WARNING LIST
The number of warning lists printed until now.
(31) NUMBER OF PRINTING HELP
The number of help lists printed until now.
(32) NUMBER OF DIVIDED PRINTING IN FAX RECEPTION
The number of faxes received that were divided into more than one sheet since the unit was purchased.
(33) DETECTION OF RS232C
When the fax and PC serial cable (RS232C) are connected and the signal is received correctly, COMPLETE will be printed. For models without a PC interface or when there is a PC interface but the signal cannot be received between the fax and PC, INCOMPLETE will be printed. (The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)
(34) Not Used
(35) Not Used
(36) FAX MODE
Means the unit received a fax message in the FAX mode.
(37) MAN RCV
Means the unit received a fax message by manual operation.
(38) FRN RCV
Means the unit received a fax message by friendly signal detection.
(39) VOX
Means the unit detected silence or no voice.
(40) RMT DTMF
Means the unit detected DTMF (Remote Fax activation code) entered remotely.
(41) PAL DTMF
Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
(42) TURN-ON
Means the unit started to receive after 15 rings. (Remote Turn On: Service Code #573)
(43) TIME OUT
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.
(44) IDENT
Means the unit detected Ring Detection.
(45) CNG OGM
Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode, or while answering a call in the EXT-TAM mode. Or means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.
(46) CNG ICM
Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.
(47) Not Used
(48) ICU VERSION
Image Control Software Version.
(49) ENGINE VERSION
Engine Control CPU Version.

2.4.7. SPECIAL SERVICE JOURNAL REPORTS

Journal 2 and Journal 3 shown below, which are special journals giving the additional detailed information about the latest 35 communications, can be printed by Service Code 881 or 882. Remote printing function for the journal reports (JOURNAL, JOURNAL 2 and JOURNAL 3) is also available for service technicians. (Refer to 2.3.5.2. REMOTE PROGRAMMING().) The JOURNAL report only gives you basic information about a communication, but the other two journal reports provide different information on the same item (communication).



JOURNAL

Mar. 23 2000 09:51AM
YOUR LOGO :
YOUR FAX NO:

NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	3332222	Jan. 21 02:14PM	00'45	SND	01	OK	
02	9998765	Jan. 21 03:17PM	00'58	SND	02	OK	
03	John	Jan. 21 05:18PM	00'48	RCV	01	OK	
04	555556677	Jan. 22 10:35AM	02'45	RCV	03	COMMUNICATION ERROR	(46)

JOURNAL 2

Mar. 23 2000 09:51AM

NO.	(1) RCV. MODE	(2) SPEED (CNT.)	(3) RESOLUTION	(4) RCV-TRIG.(CNT.)	(5) ERROR->MEMORY
01	TEL	9600BPS	STD.		
02	TEL	9600BPS	FINE		
03	FAX ONLY	7200BPS	STD.	FAX MOD	
04	FAX ONLY	9600BPS	STD.	CNG (0003)	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	(1) RCV MODE	(4) RCV-TRIG (CNT.)

YOUR LOGO
YOUR FAX NUMBER

JOURNAL 3

Mar. 23 2000 09:51AM

NO.	(6) ENCODE	(7) MSLT	(8) EQM(RX)	(9) ERROR LINE(RX)	(10) MAKER CODE
01	MH	20msec	0000	00000	79
02	MH	20msec	0000	00000	00
03	MR	20msec	1200	00013	00
04	MR	20msec	0000	00000	00

HOW TO READ JOURNAL REPORTS:

Example:

1. Look at NO. 01 in the JOURNAL. If you want to know about the details about that item, see NO. 01 in the JOURNAL 2 and the JOURNAL 3. You can get the following information.
*** MODE: Fax transmission / * RCV. MODE: TEL / * TX SPEED: 9.6 kbps / * RESOLUTION: standard / * ENCODE: MH / * MAKER CODE: 79**

2. Look at NO. 04 in the JOURNAL 2. CNG (0003) indicates that the CNG signal has been received three times since the purchase date.

For further details, see 2.4.7.1. JOURNAL 2() and 2.4.7.2. JOURNAL 3().

2.4.7.1. JOURNAL 2

Refer to JOURNAL 2 in 2.4.7.3. PRINTOUT EXAMPLE().
Journal 2 displays the additional detailed information about the last 35 communications.
Descriptions:
(1) RCV. MODE
Indicates which receive mode the unit was in when the unit received a fax message.
This information is also displayed when the unit transmitted a fax message.
(2) SPEED
Indicates the speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. If there is a communication error, "?" is displayed.
(3) RESOLUTION
Indicates the resolution of the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. If there is a communication error, "?" is displayed.
(4) RCV-TRIG. (CNT.)
Indicates the trigger that causes the unit to switch to the fax receive mode. The available options are listed in JOURNAL 2 in 2.4.7.3. PRINTOUT EXAMPLE(). The values in parentheses indicate how many times the trigger has been used. (For example, "0003" means three times.)

No.	Display	Function
1	FAX MODE	Means the unit received a fax message in the FAX mode.
2	MAN RCV	Means the unit received a fax message by manual operation.
3	FRN RCV	Means the unit received a fax message by friendly signal detection.
4	VOX	Means the unit detected silence or no voice.
5	RMT DTMF	Means the unit detected DTMF (Remote Fax activation code) entered remotely.
6	PAL DTMF	Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
7	TURN-ON	Means the unit started to receive after 15 rings. (Remote Turn On: Service Code #573)
8	TIME OUT	Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL /FAX mode.
9	IDENT	Means the unit detected Ring Detection.
10	CNG OGM	Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode. / OR / Means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.
11	CNG ICM	Means the unit detected the CNG while it was recording the ICM in the ANS/ FAX mode.

(5) ERROR → MEMORY
Indicates the reason why the unit received a fax message in memory.
If you look at No.11 in the JOURNAL 2 in 2.4.7.3. PRINTOUT EXAMPLE(), it shows the fax

message was received in memory due to "PAPER OUT" error.

[NO RESPONSE DISAPPEARED ON JOURNAL]

The "NO RESPONSE DISAPPEARED ON JOURNAL" displays the information about the last 10 communications terminated by "No Response". (Some of the communications terminated by "No Response" were not displayed in the JOURNAL.)

When a fax transmission cannot be performed because the other party's unit is set to the TEL mode, "No response" will be printed.

2.4.7.2. JOURNAL 3

Refer to JOURNAL 3 in 2.4.7.3. PRINTOUT EXAMPLE().

Descriptions:

(6) ENCODE

Compression Code: MH/MR

(7) MSLT

MSLT means Minimum Scan Line Time. Used only at the factory.

(8) EQM

EQM means Eye Quality Monitor. Used only at the factory.

(9) ERROR LINE(RX)

When an error occurs while receiving a fax, this shows the number of error lines.

(10) MAKER CODE

This shows a 2 digit code of the other party's fax machine brand.

0E: "KX" model

00: Unknown

79: "UF" model

19: "Xerox" model

2.4.7.3. PRINTOUT EXAMPLE

JOURNAL2

Mar. 25 2000 01:59PM

NO.	RCV. MODE	SPEED (CNT.)	RESOLUTION	RCV-TRIG. (CNT.)	ERROR->MEMORY
01	FAX ONLY	9600BPS	FINE.	FAX MOD	
02	FAX ONLY	9600BPS	STD.	FAX MOD	
03	FAX ONLY	9600BPS	FINE.		
04	FAX ONLY	9600BPS	FINE.	FAX MOD	
05	FAX ONLY	9600BPS	FINE.	FAX MOD	
06	FAX ONLY	9600BPS	FINE.	FAX MOD	
07	FAX ONLY	9600BPS	FINE.		
08	FAX ONLY	9600BPS	FINE.		
09	FAX ONLY	9600BPS	FINE.		
10	FAX ONLY	9600BPS	STD.	FAX MOD	
11	FAX ONLY	9600BPS	FINE.	FAX MOD	PAPER OUT
12	FAX ONLY	9600BPS	STD.	FAX MOD	
13	FAX ONLY	9600BPS	STD.		
14	FAX ONLY	?	?		
15	FAX ONLY	?	?		
16	FAX ONLY	?	?		
17	FAX ONLY	9600BPS	STD.		
18	FAX ONLY	9600BPS	FINE.	FAX MOD	
19	FAX ONLY	9600BPS	STD.	FAX MOD	
20	FAX ONLY	9600BPS	S-FINE.		
21	FAX ONLY	9600BPS	FINE.		
22	FAX ONLY	9600BPS	FINE.	FAX MOD	
23	FAX ONLY	?	?	FAX MOD	
24	FAX ONLY	9600BPS	STD.	FAX MOD	
25	FAX ONLY	9600BPS	STD.	FAX MOD	
26	FAX ONLY	9600BPS	FINE.	FAX MOD	
27	FAX ONLY	9600BPS	FINE.		
28	FAX ONLY	9600BPS	STD.	FAX MOD	
29	FAX ONLY	9600BPS	FINE.	FAX MOD	
30	FAX ONLY	9600BPS	S-FINE.	FAX MOD	
31	FAX ONLY	9600BPS	STD.	FAX MOD	
32	FAX ONLY	9600BPS	STD.	FAX MOD	
33	FAX ONLY	?	?	FAX MOD	
34	FAX ONLY	9600BPS	STD.	FAX MOD	
35	FAX ONLY	9600BPS	STD.	FAX MOD	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RCV MODE	RCV-TRIG. (CNT.)

JOURNAL3

Mar. 25 2000 01:58PM

NO.	ENCODE	MSLT	EOM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10msec	007A	00000	0E
02	MR	20msec	016B	00000	00
03	MH	10msec	0000	00000	00
04	MR	20msec	019B	00003	00
05	MR	20msec	0156	00011	00
06	MR	20msec	0113	00000	00
07	MR	5msec	0000	00000	79
08	MR	5msec	0000	00000	79
09	MR	0msec	0000	00000	19
10	MR	20msec	0100	00000	00
11	MR	10msec	0073	00000	0E
12	MR	20msec	012B	00000	00
13	MH	20msec	0000	00000	79
14	MH	20msec	0000	00000	00
15	MH	20msec	0000	00000	00
16	MH	20msec	0000	00000	00
17	MR	5msec	0000	00000	79
18	MR	10msec	00AB	00004	0E
19	MR	20msec	0124	00000	00
20	MR	20msec	0000	00000	00
21	MR	20msec	0000	00000	00
22	MR	20msec	0135	00000	00
23	MR	20msec	0000	00000	00
24	MR	20msec	01BC	00000	00
25	MR	20msec	01AC	00000	00
26	MR	20msec	020F	00000	00
27	MR	10msec	0000	00000	0E
28	MR	20msec	01DF	00000	00
29	MR	20msec	01EA	00000	00
30	MR	20msec	00CD	00000	00
31	MR	20msec	02F8	00000	0E
32	MR	10msec	04F8	00000	0E
33	MR	10msec	0000	00000	00
34	MR	20msec	03B6	00000	0E
35	MH	20msec	00E0	00000	00

2.5. TEST FUNCTIONS

The codes listed below can be used to perform simple checks of some of the unit's functions. When complaints are received from customers, they provide an effective tool for identifying the locations and causes of malfunctions.

Test mode	Type of Mode	Code □□□ Operation after code input	Function
MOTOR TEST	Service Mode	5 5 6 START	Rotates the transmission and reception motor to check the operation of the motor. 13 ... FAX TX/Reading memory 14 ... Document feed 23 ... Recording paper is fed 33 ... List/FAX RX print, pull back recording paper 43 ... Copy 05 ... Recording paper feed (Test a recording paper feeding operation by shifting from 23 to 33.) • Press the STOP button to quit.
MODEM TEST	Service Mode	5 5 4 START	Telephone line circuit is connected automatically, output the following signals on the circuit line. 1) OFF 2) 9600bps 3) 7200bps 4) 4800bps 5) 2400bps 6) 300bps 7) 2100Hz 8) 1100Hz
ROM CHECK	Service Mode	5 5 1 START	Indicates the version and check sum of the ROM.
SCAN CHECK	Service Mode	5 5 5 START	Turns on the LEDs of the CIS and operates the read system.
LCD CHECK	Service Mode	5 5 8 START	Checks the LCD indication. Illuminates all the dots to check if they are normal.
DTMF SINGLE TEST	Service Mode	5 5 2 1..On 2..Off	Outputs DTMF as single tones. Used to check the frequencies of the individual DTMF tones. Refer to **2.5.1. DTMF SINGLE TONE TRANSMIT SELECTION**.
LED TEST	Service Mode	5 5 7 START	All LEDs above the operation panel board flash on and off, or are illuminated.
KEY CHECK	Service Mode	5 6 1 START { any key }	Checks the button operation. Indicates the button code on the LCD while the button is pressed. Refer to **2.5.2. BUTTON CODE TABLE**.
FACTORY SET	Service Mode	5 5 0 START	Clears the memory where the user can store data.
PRINT TEST PATTERN	Service Mode	8 5 2 START	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~4. (See **2.5.3. PRINT TEST PATTERN**.)

CROSS REFERENCE:

2.5.1. DTMF SINGLE TONE TRANSMIT SELECTION()

2.5.2. BUTTON CODE TABLE()

2.5.3. PRINT TEST PATTERN()

Test mode	Type of Mode	Code □□□ Operation after code input	Function
SENSOR CHECK & VOX CHECK	Service Mode	8 1 5 START LCD display Do Sn Co Pt Vx	If you enter this mode and operate sensor levers with your hands, the LCD display of the related sensor (or switch) turns ON/OFF. Also, when copying a document, the related sensor will turn ON/OFF. (Do, Sn, Pl, Pt, Ri) For each sensor's operation, refer to **6.5. SENSORS AND SWITCHES**. Do: Document set sensor: Paper inserted. Turns on when a document is inserted. Sn: Read position sensor: At the read position. Turns on when the front cover is opened and the sensor lever is pressed directly. Co: Cover open sensor: Film end sensor: Cover open or don't set the film. Turns on and off when the front cover is opened and closed. Pt: Paper top sensor: Sensor on. Turns on when the front cover is opened and the sensor lever is pressed directly. Vx: Vox signal: Detection signal for the tone on the line. Turns on when there is a tone signal on the line.

Note:

The numbers in the boxes (XXX) indicate the keys to be input for the various test modes.

CROSS REFERENCE:

6.5. SENSORS AND SWITCHES()

2.5.1. DTMF SINGLE TONE TRANSMIT SELECTION

When set to ON (=1), the 12 keys and transmission frequencies are as shown.

key	High Frequency (Hz)	Key	Low Frequency (Hz)
"1"	697	"5"	1209
"2"	770	"6"	1336
"3"	852	"7"	1477
"4"	941	"8"	1633

When set to OFF (=2), the 12 keys and transmission frequencies are as shown.

High (Hz) / Low (Hz)	1209	1336	1477
697	"1"	"2"	"3"
770	"4"	"5"	"6"
852	"7"	"8"	"9"
941	*	"0"	"#"

Note:

After performing this check, do not forget to turn the setting off. otherwise, dialing in DTMF signal will not work.

2.5.2. BUTTON CODE TABLE

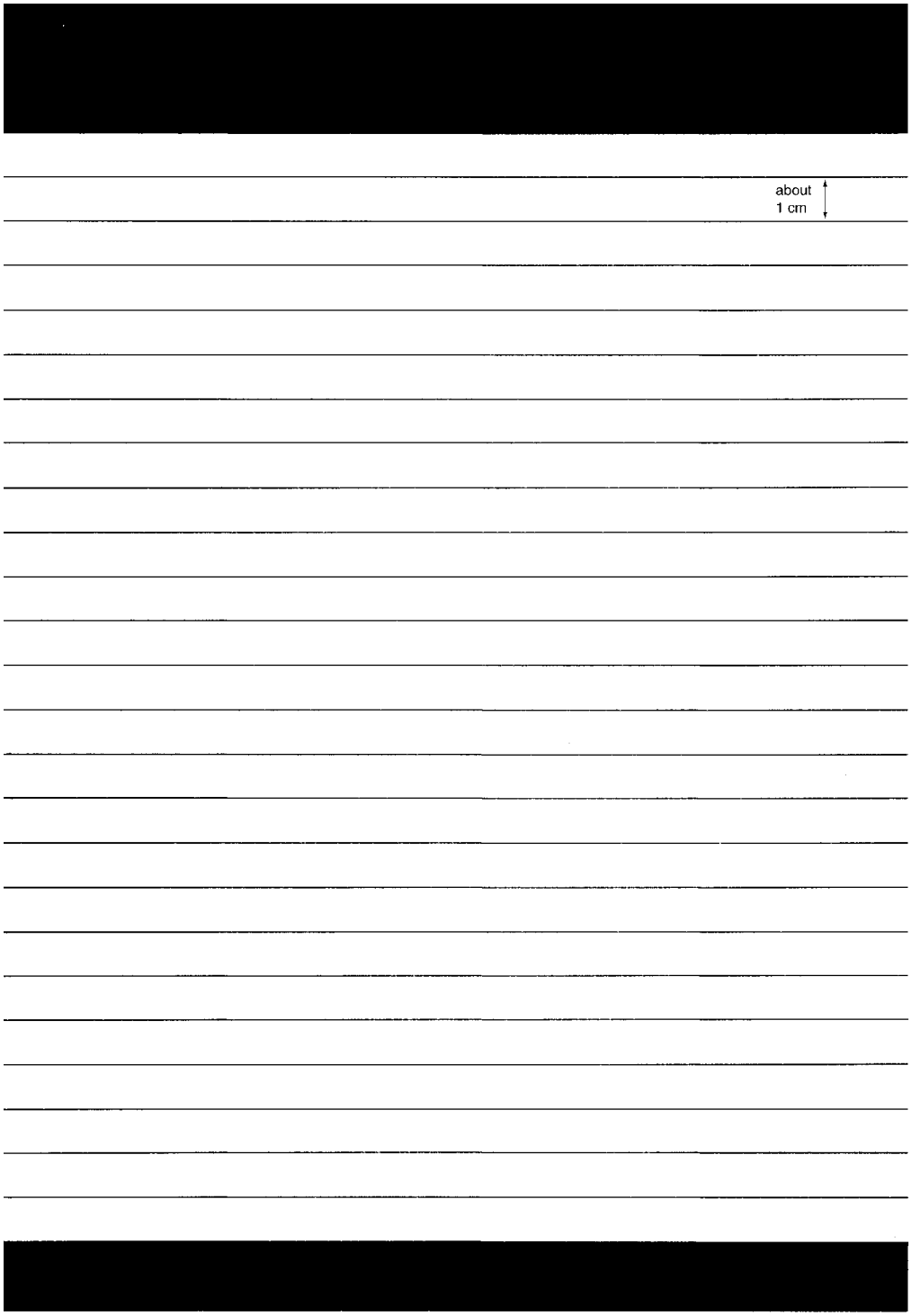
Code	Button Name	Code	Button Name	Code	Button Name
02	RESOLUTION	31	1	3C	#
04	START/COPY/SET	32	2	3D	REDIAL/PAUSE
08	MONITOR	34	3	3E	FLASH
0A	MUTE	35	4	49	QUICK SCAN
0C	AUTO ANSWER	36	5	1E	JOG (RIGHT)
20	MENU	37	6	1F	JOG (LEFT)
22	HELP	38	7	4A	COLLATE
24	DIRECTORY	39	8	00	NO INPUT
25	▲ VOLUME	3A	9	01	STOP
26	▼ VOLUME	3B	0		
			✳		

Note:
These codes (00, 01) are only for the data in the History Report.

2.5.3. PRINT TEST PATTERN

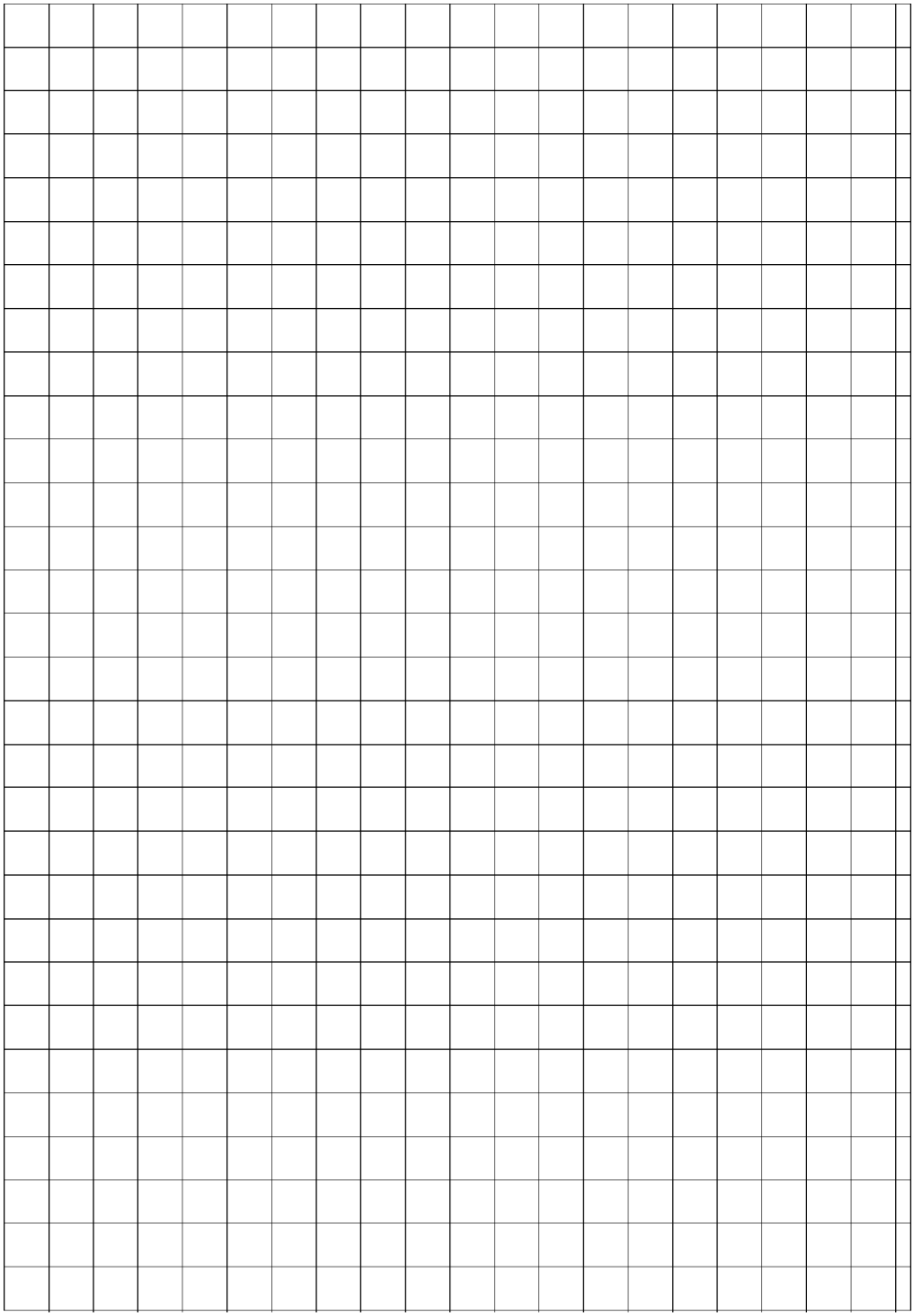
1. Platen roller

(Reference pattern)



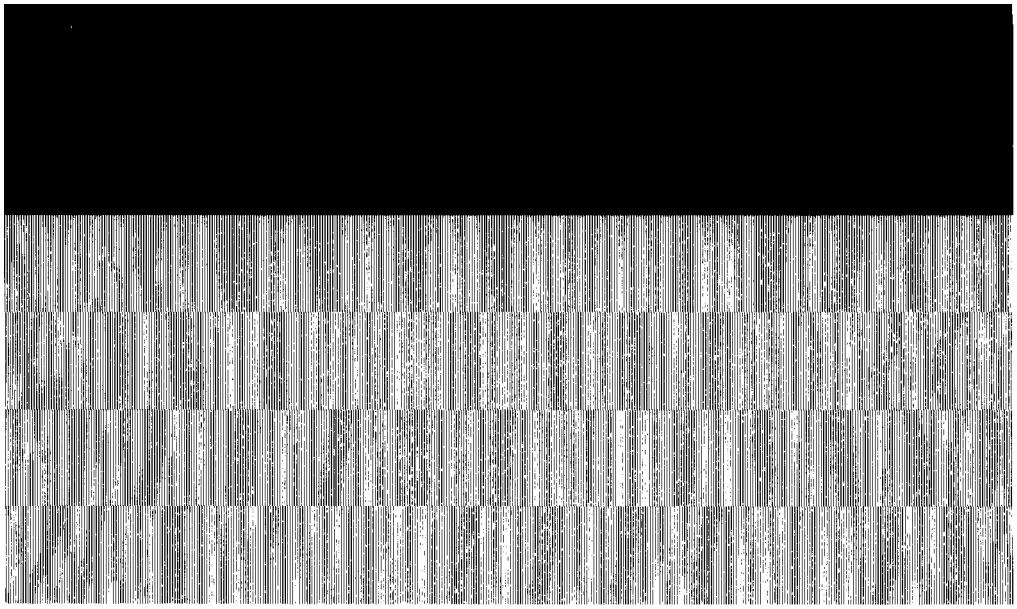
2. Left margin/Top margin

(Reference pattern)



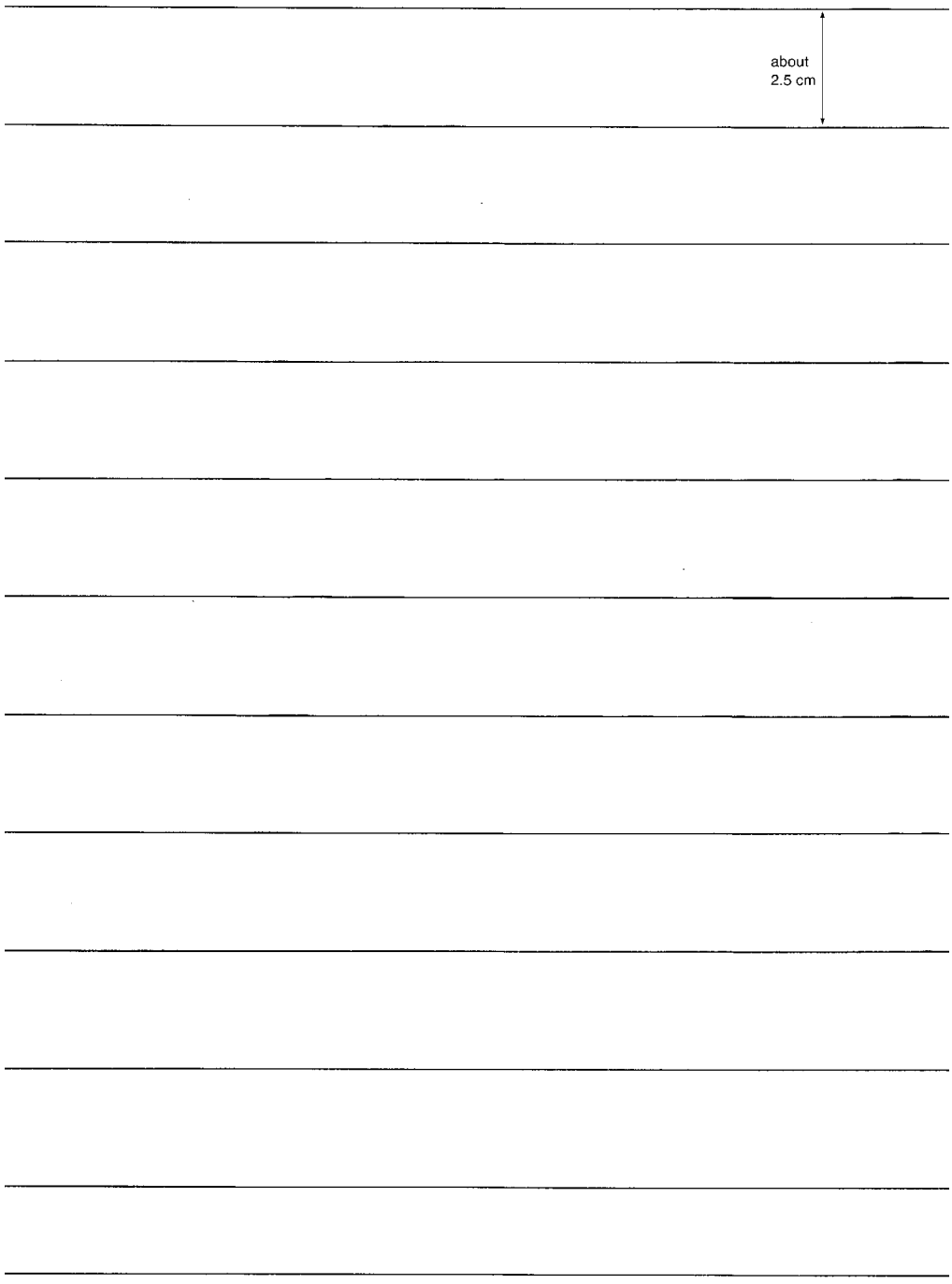
3. Thermal head 1 dot

(Reference pattern)



4. Use this test pattern to confirm the torque limiter for Ink film and platen roller timing.

(Reference pattern)



3. ADJUSTMENTS

3.1. ADJUSTING THE FEEDER PRESSURE

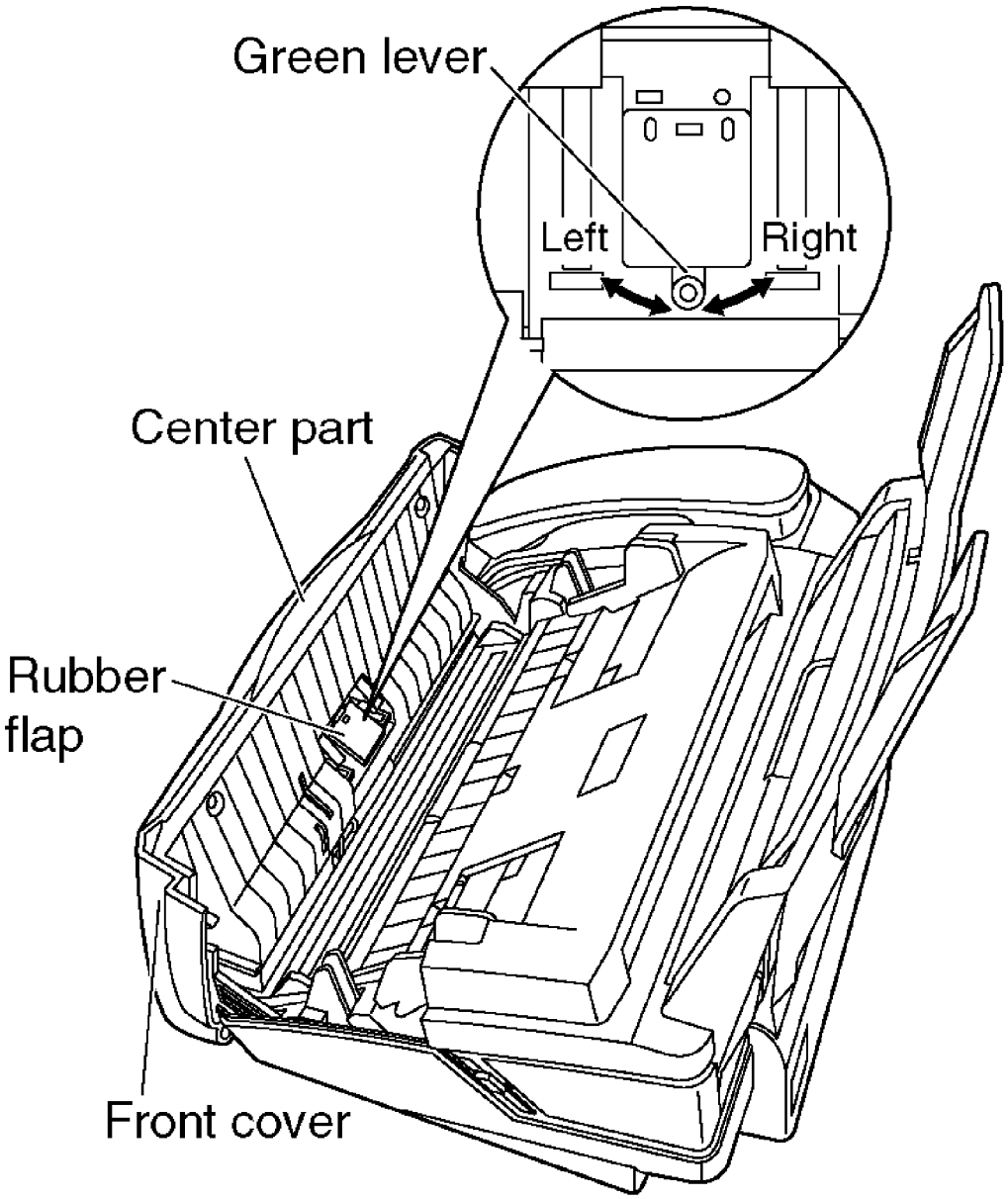
If misfeeding of a document such as multiple feeding or no feeding occurs frequently, try to adjust the feeder pressure by following the steps below.

1. Open the front cover by pulling up the center part.

2. Shift the position of the green lever by using an instrument with a

pointed end, such as a paper clip.
Left: When documents multiple feed.
Center: Standard position (pre-selected)
Right: When documents do not feed.

3. Close the front cover securely.



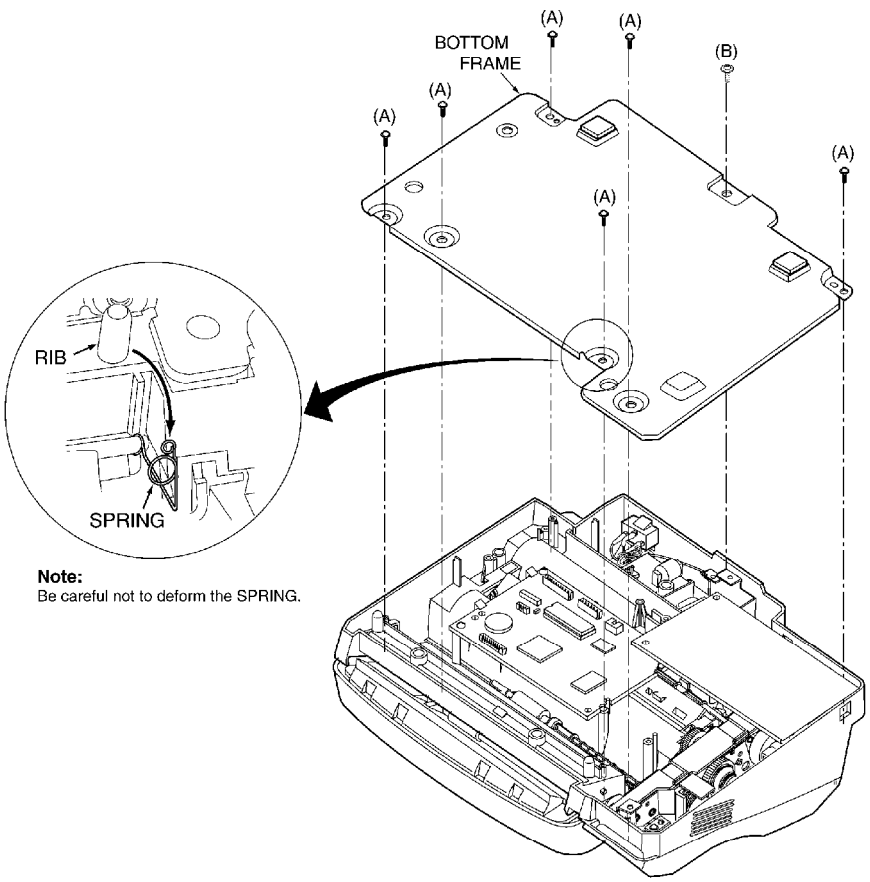
4. DISASSEMBLY INSTRUCTIONS

4.1. HOW TO REMOVE THE BOTTOM FRAME

Procedure: 1

REF No. 1

1) Remove the 6 screws (A).
2) Remove the 1 screw (B).
3) Remove the SPRING from the RIB.
4) Remove the BOTTOM FRAME.



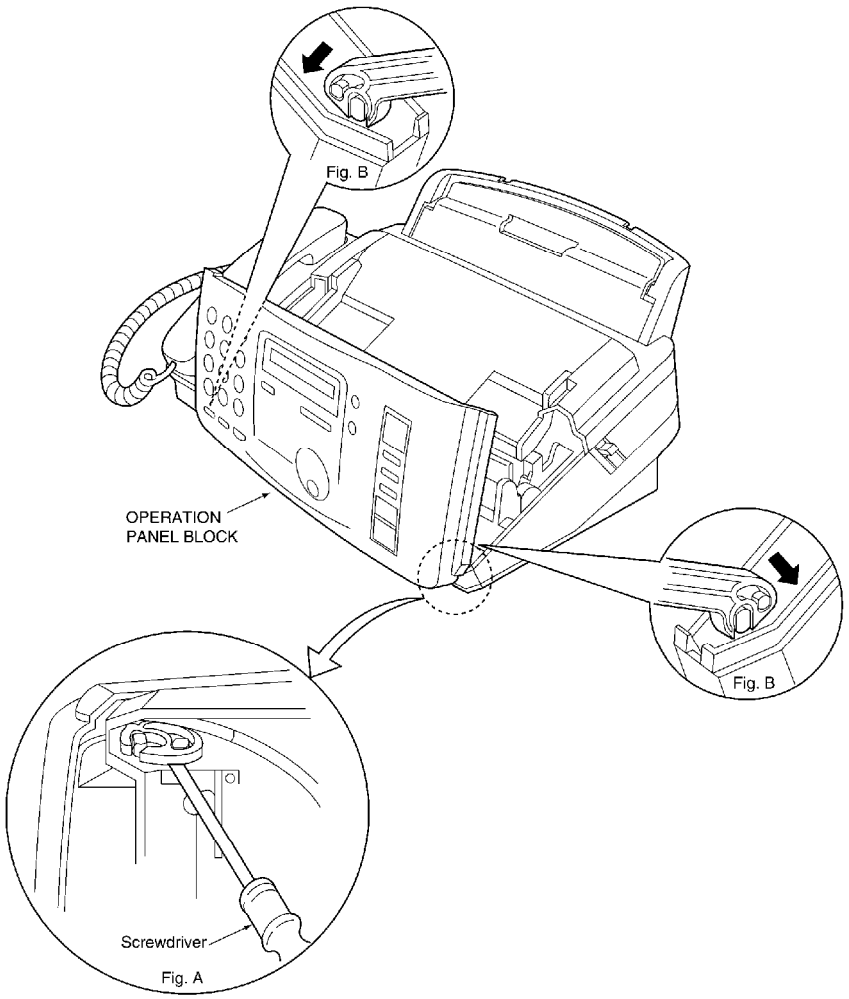
Note:
Be careful not to deform the SPRING.

4.2. HOW TO REMOVE THE OPERATION PANEL BLOCK

Procedure: 1-->2

REF No. 2

1) Unhook all the connectors connecting the main cabinet with the OPERATION PANEL BLOCK.
2) Open the OPERATION PANEL BLOCK by pulling up the center part.
3) Tilt the unit vertically so that its left side faces down the grey-shaded ARM as illustrated in Fig. A, insert a screwdriver and unlatch the ARM as illustrated in Fig. A.
4) Pull out both sides of the arms (in the direction of the arrow shown in Fig. B).
5) Remove the OPERATION PANEL BLOCK.

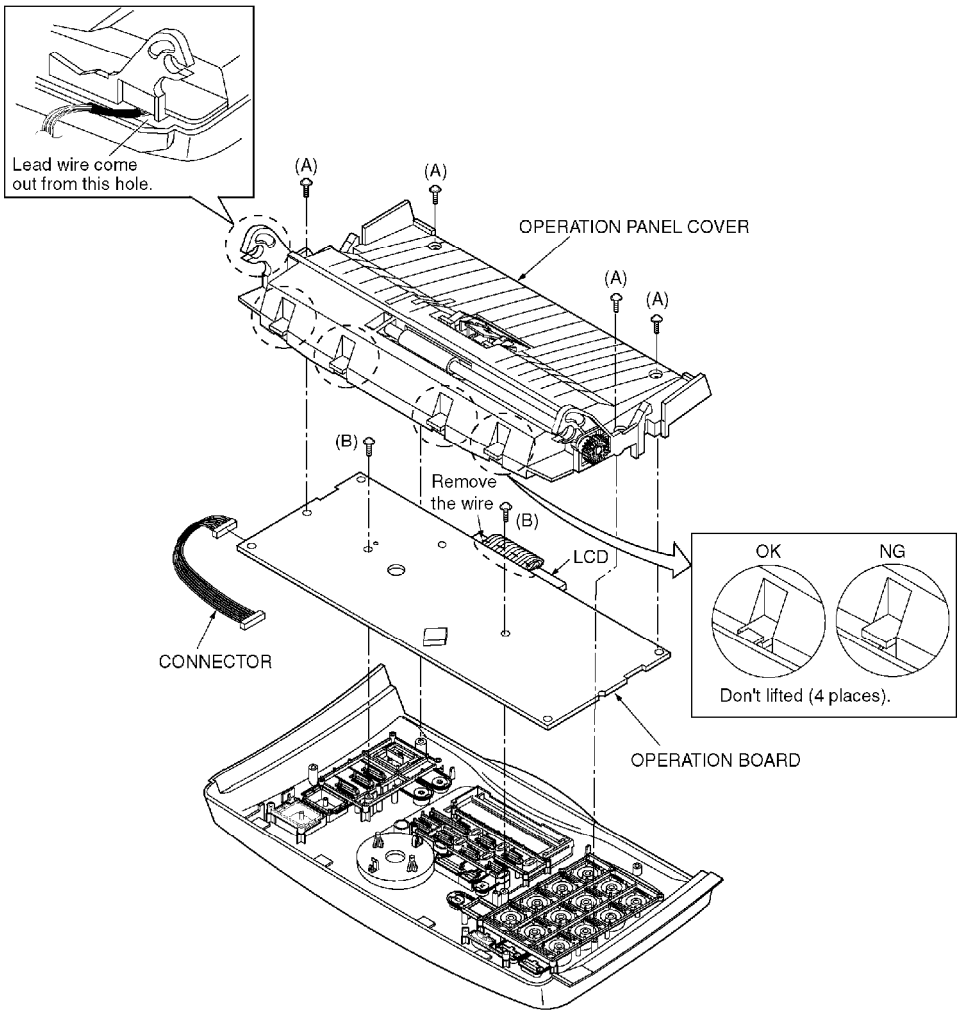


4.3. HOW TO REMOVE THE OPERATION BOARD AND LCD

Procedure: 1-->2-->3

REF No. 3

1) Remove the 4 screws (A).
2) Remove the OPERATION PANEL COVER.
3) Remove the 2 screws (B).
4) Disconnect the CONNECTOR.
5) Remove the OPERATION BOARD.
6) Remove the wire for LCD.
7) Remove the LCD.

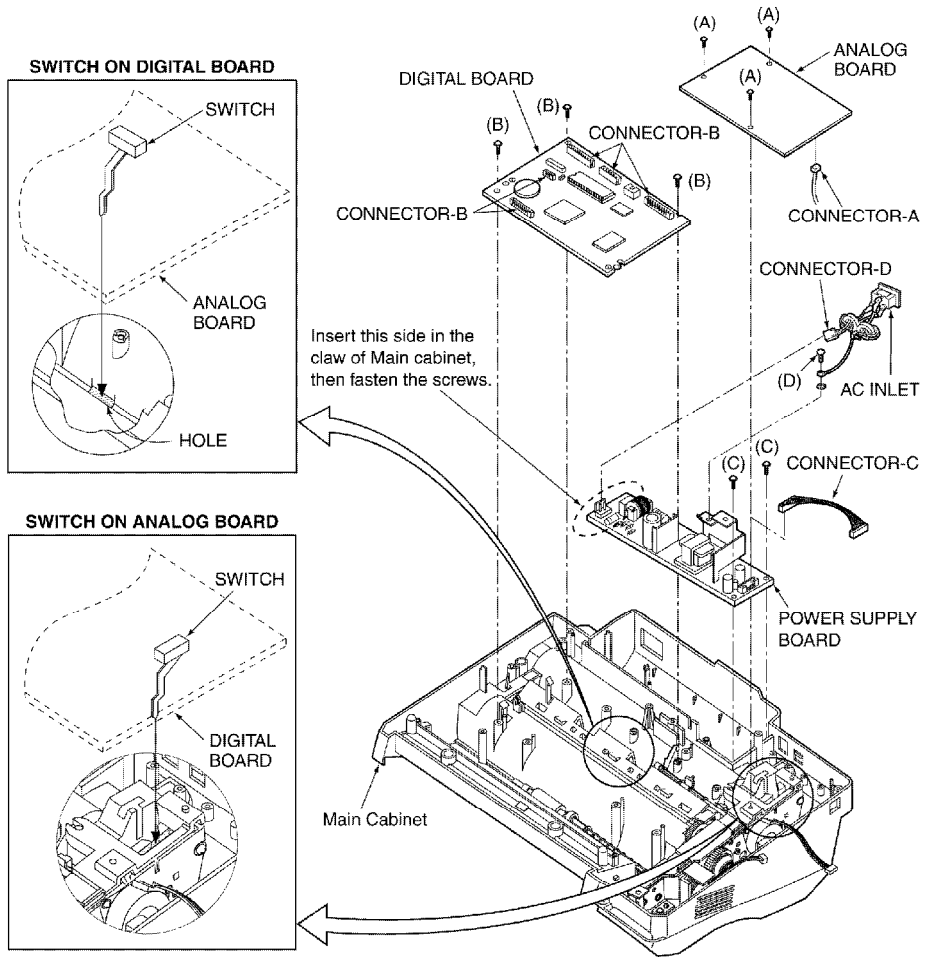


4.4. HOW TO REMOVE THE ANALOG, DIGITAL AND POWER BOARDS AND AC INLET

Procedure: 1-->4

REF No. 4

1) Remove the 3 screws (A).
2) Disconnect the CONNECTOR-A.
3) Remove the ANALOG BOARD.
4) Disconnect the CONNECTORs-B.
5) Remove the 3 screws (B).
6) Remove the DIGITAL BOARD.
7) Remove the 2 screws (C) and screw (D).
8) Disconnect the CONNECTOR-C and .CONNECTOR-D.
9) Remove the POWER SUPPLY BOARD.
10) Remove the AC INLET.

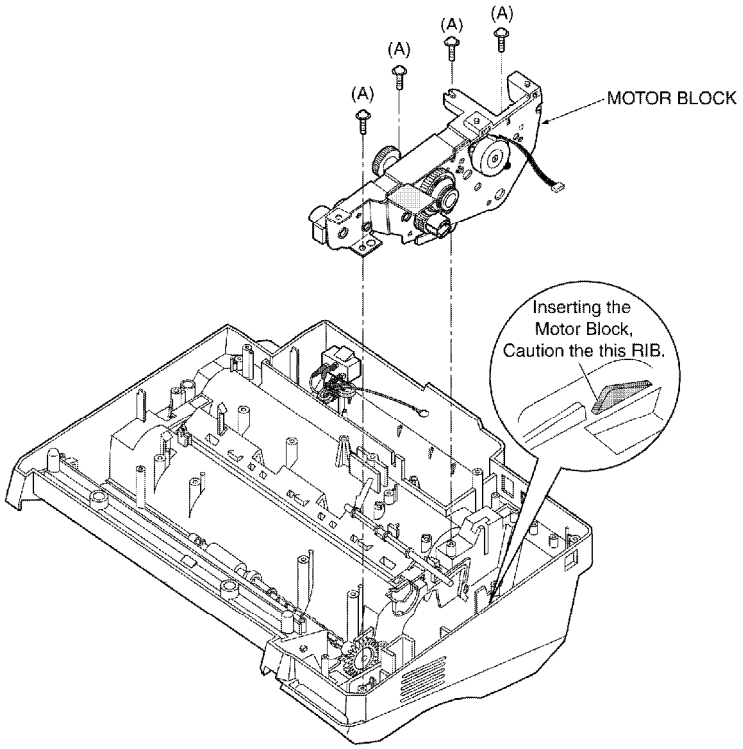


4.5. HOW TO REMOVE THE MOTOR BLOCK

Procedure: 1-->4-->5(a)

REF No. 5(a)

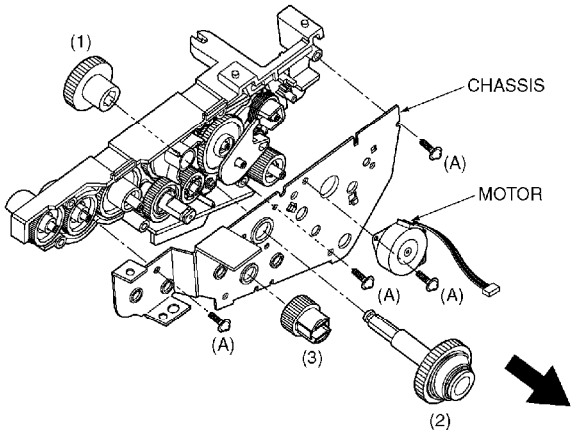
1) Remove the 4 screws (A).
2) Remove the MOTOR BLOCK. [See **REF No. 5(b)**]



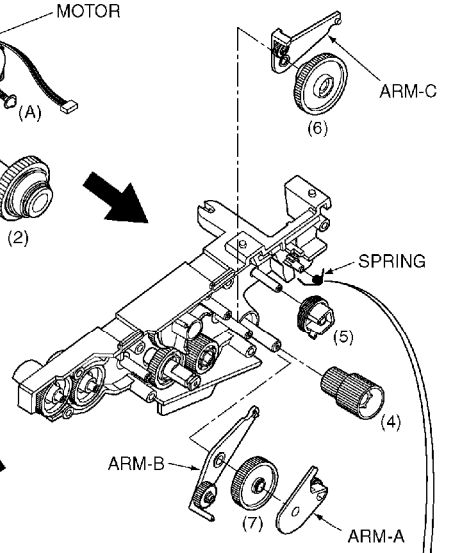
Procedure: 1-->4-->5(a)-->5(b)

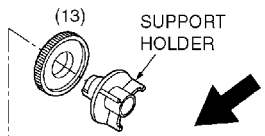
REF No. 5(b)

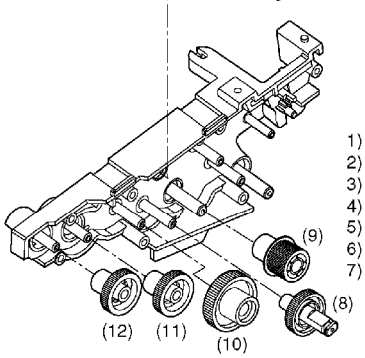
1) Remove the 4 screws (A).
2) Remove the MOTOR and CHASSIS.
3) Remove the gear (1). (See Fig. A)
4) Remove the gear (2).
5) Remove the gear (3). (See Fig. B)



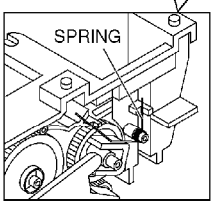
1) Remove the gear (4).
2) Remove the SPRING.
3) Remove the gear (5).
4) Remove the ARM-A.
5) Remove the gear (6).
6) Remove the gear (7).
7) Remove the ARM-B.
8) Remove the ARM-C.







1) Remove the gear (8).
2) Remove the gear (9).
3) Remove the gear (10).
4) Remove the gear (11).
5) Remove the gear (12).
6) Remove the SUPPORT HOLDER.
7) Remove the gear (13).



INSERTING POSITION
OF SPRING

4.6. HOW TO REMOVE THE SEPARATION ROLLER

Procedure: 1-->4-->5(a)-->6

REF No. 6

1) Remove the Sheet.
2) Remove the SEPARATON ROLLER (Fig. A).

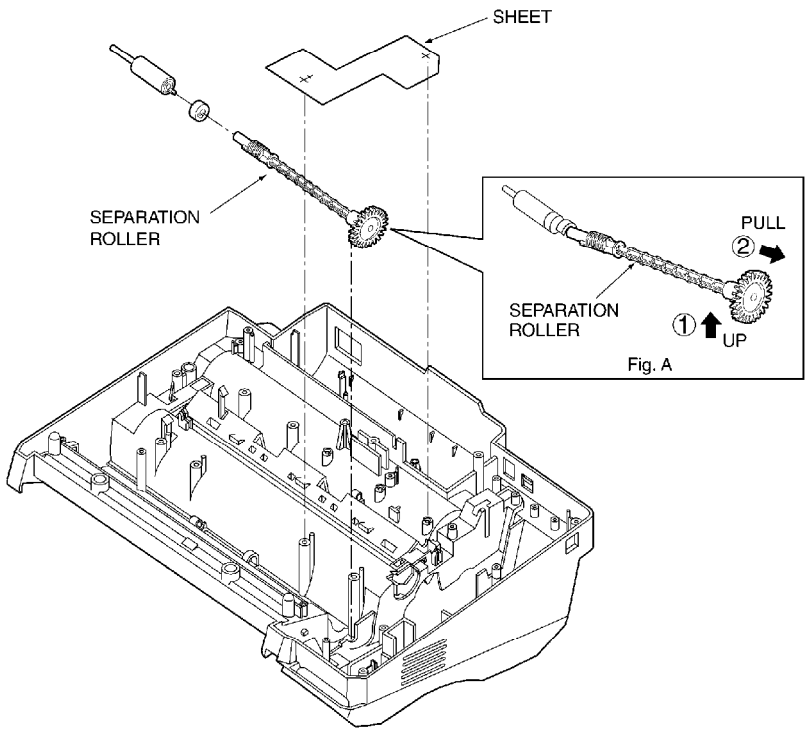


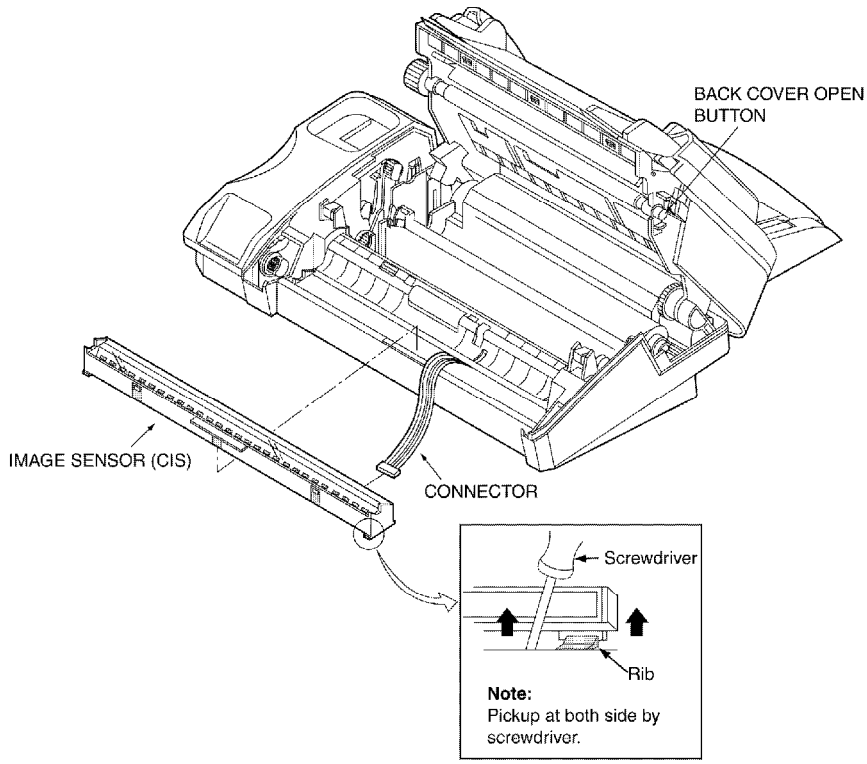
Fig. A

4.7. HOW TO REMOVE THE IMAGE SENSOR (CIS)

Procedure: 1-->2-->4-->7

REF No. 7

1) Push the BACK COVER OPEN BUTTON to open back cover.
2) Remove the CONNECTOR.
3) Remove the IMAGE SENSOR as illustrated below.



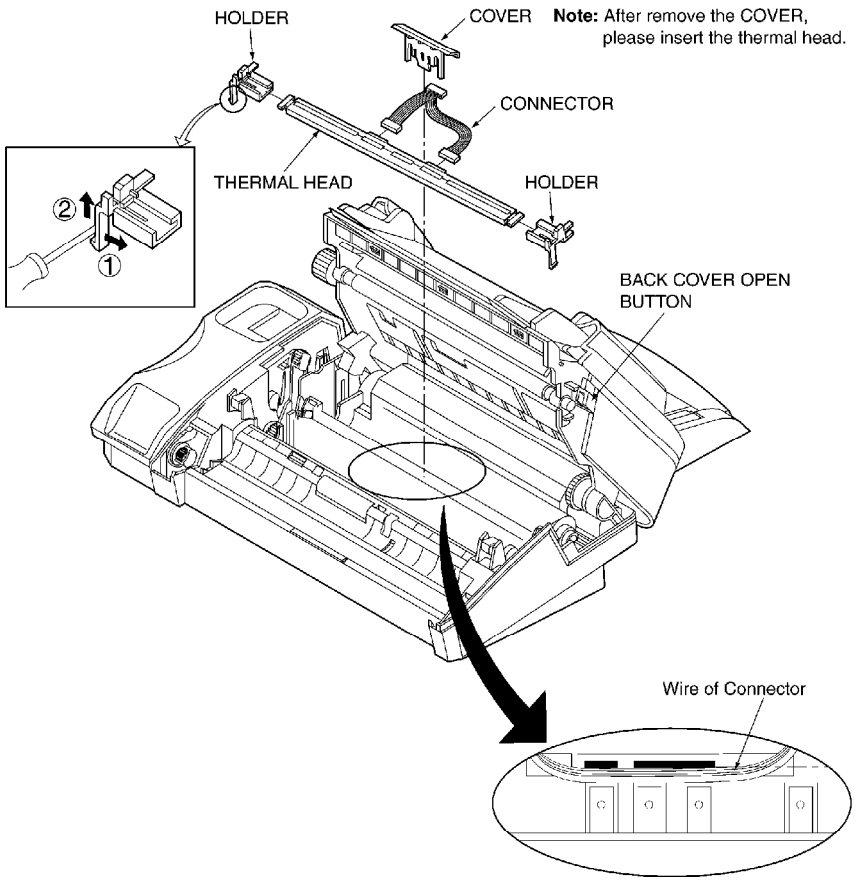
Note:
Pickup at both side by screwdriver.

4.8. HOW TO REMOVE THE TERMAL HEAD

Procedure: 1-->4-->8

REF No. 8

1) Push the BACK COVER OPEN BUTTON to open back cover.
2) Remove the 2 HOLDERs and CONNECTOR.
3) Remove the THERMAL HEAD.

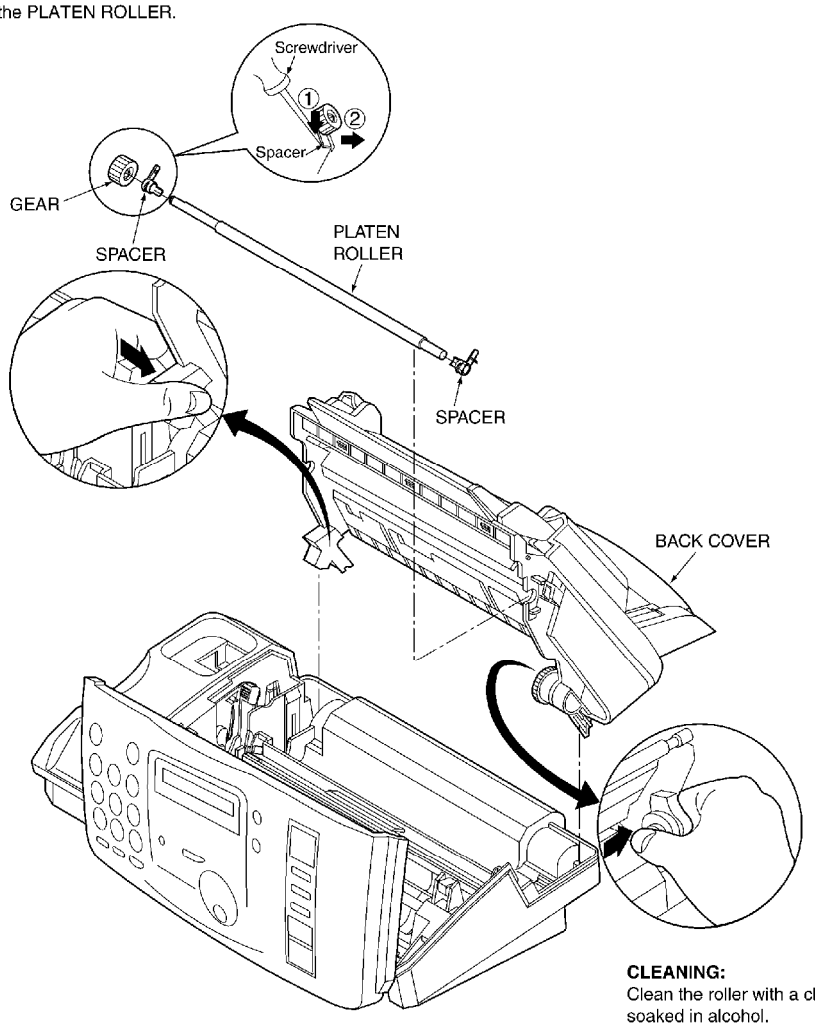


4.9. HOW TO REMOVE THE PLATEN ROLLER, BACK COVER

Procedure: 9

REF No. 9

1) Remove the FILM CARTRIDGE.
2) Push the BACK COVER OPEN BUTTON to open back cover.
3) Push the left arm (a) inside, then the BACK COVER will be stood because the stopper will be released.
4) Push both side arms of the BACK COVER to outside, then move the cover up.
5) Remove the BACK COVER.
6) Remove the 2 SPACERs from the ribs as illustrated below.
7) Remove the GEAR.
8) Remove the PLATEN ROLLER.



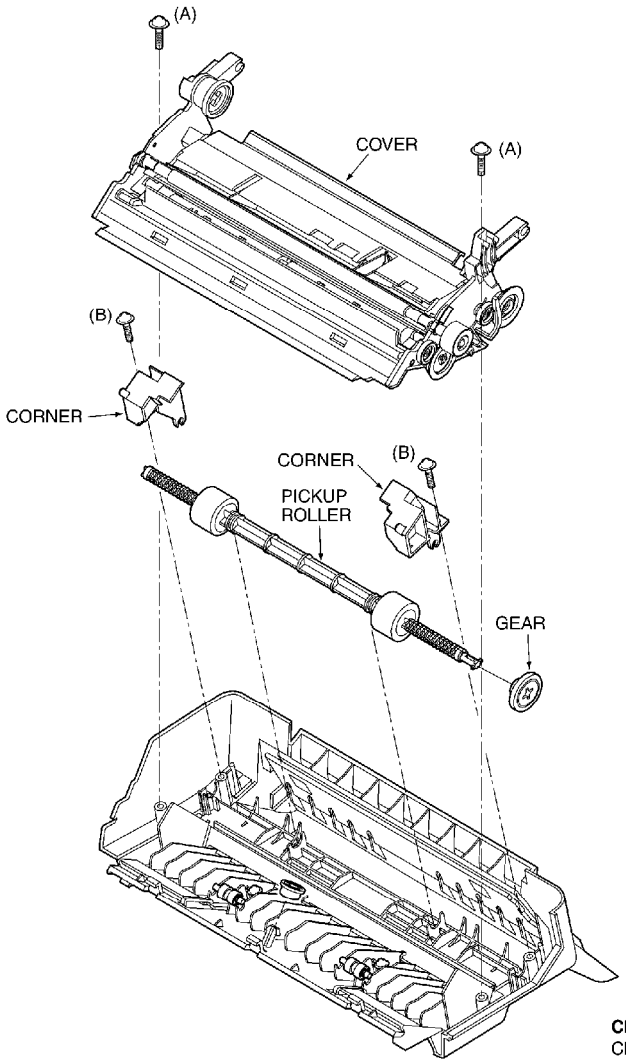
CLEANING:
Clean the roller with a cloth soaked in alcohol.

4.10. HOW TO REMOVE THE PICKUP ROLLER

Procedure: 9-->10

REF No. 10

1) Remove the 2 screws (A).
2) Remove the COVER.
3) Remove the 2 screws (B).
4) Remove the 2 CORNERs.
5) Remove the GEAR.
6) Remove the PICKUP ROLLER.



CLEANING:
Clean the roller with
a cloth soaked in alchol.

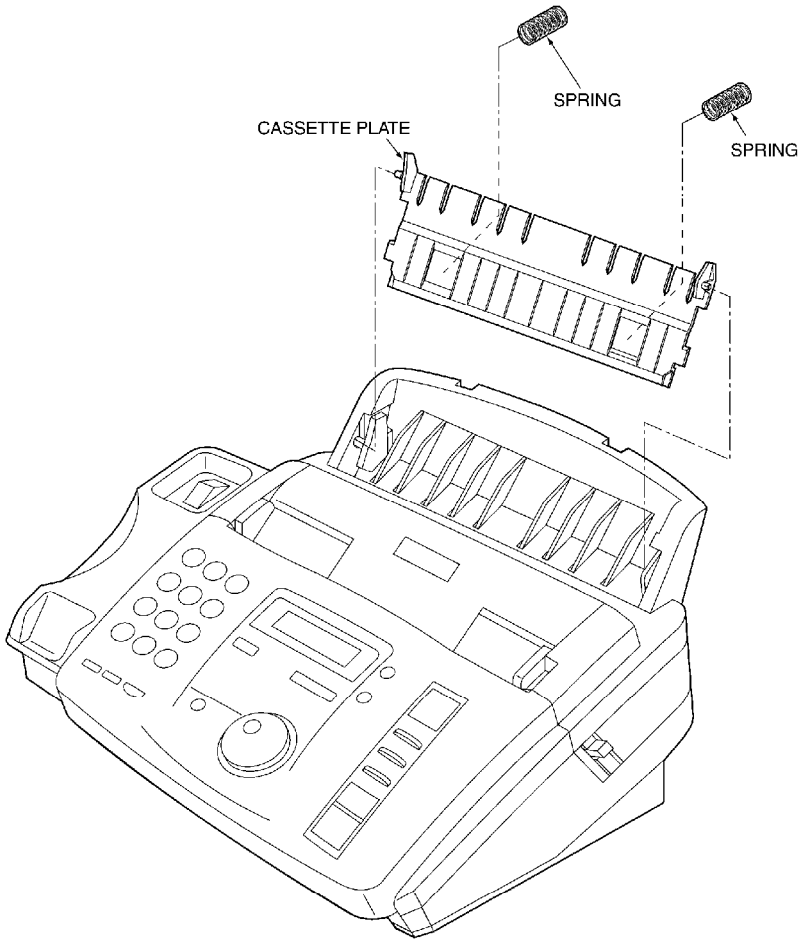
4.11. HOW TO REMOVE THE CASSETTE PLATE

Procedure: 11

REF No. 11

1) Pull up and remove the CASSETTE PLATE in the direction of the arrow.

Note: Inserting the CASSETTE PLATE the to unit, then insert the 2 SPRINGs.

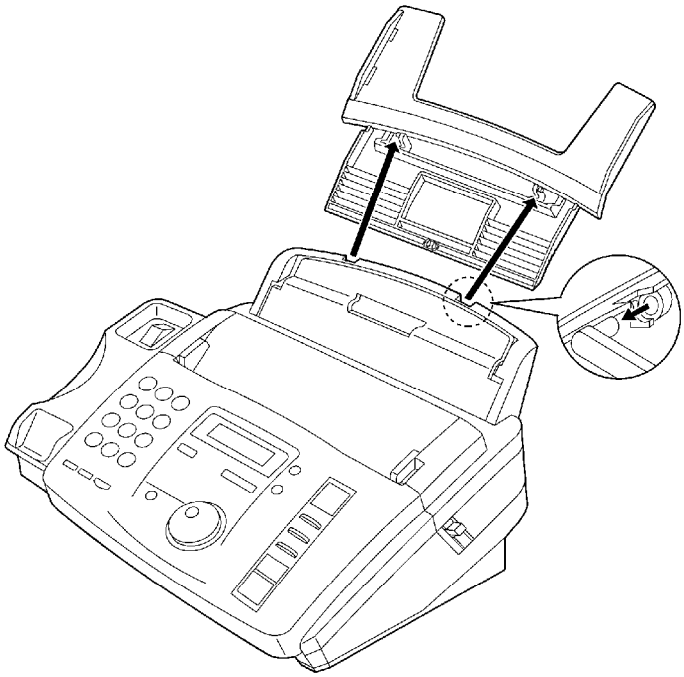


4.12. HOW TO REMOVE THE DOCUMENT TRAY

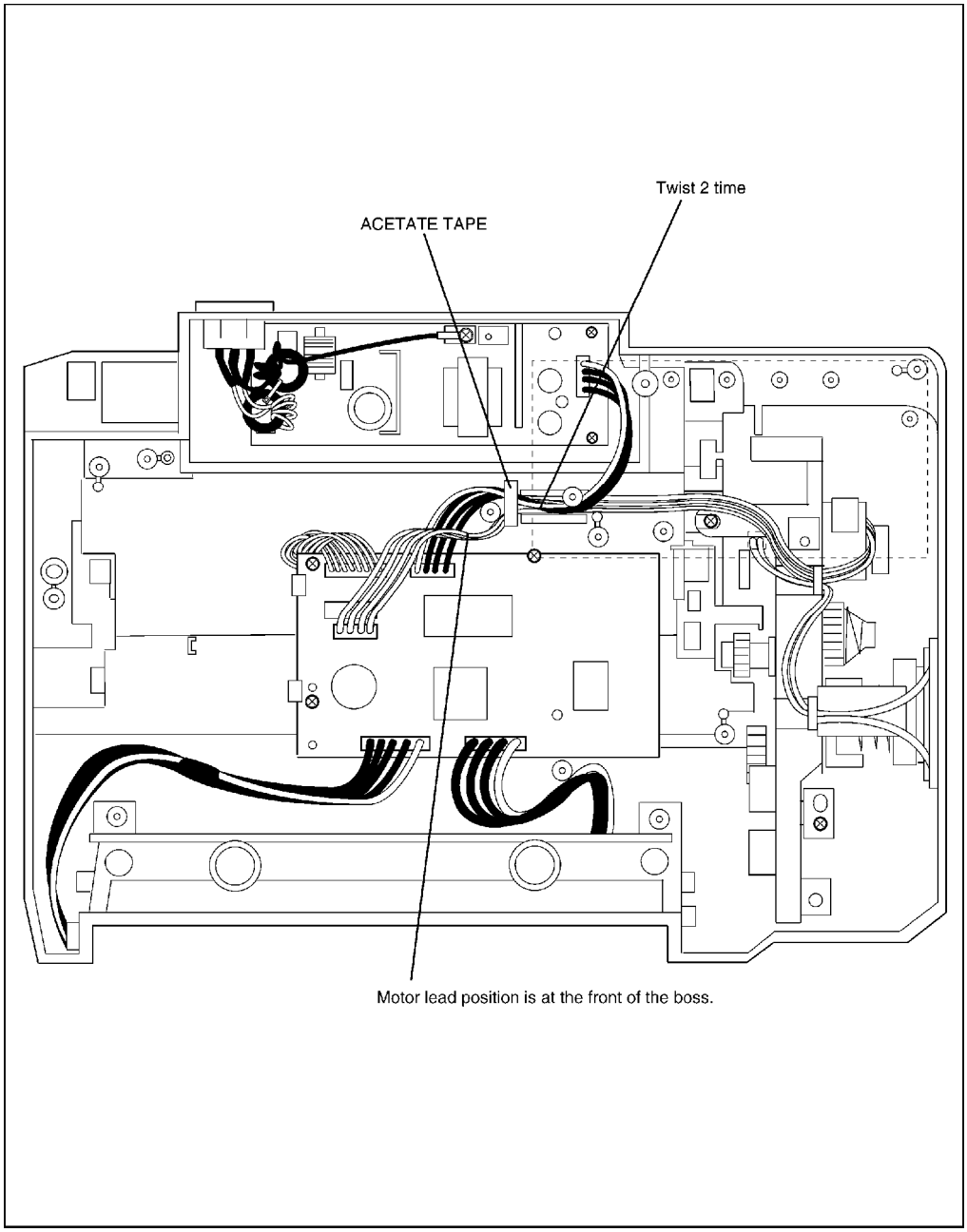
Procedure: 12

REF No. 12

1) Pull up and remove the DOCUMENT TRAY in the direction of the arrow.



4.13. INSTALLATION POSITION OF THE LEAD WIRES



5. HOW TO REPLACE THE FLAT PACKAGE IC

Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

5.1. PREPARATION

- SOLDER

Sparkle Solder 115A-1, 115B-1 OR Almit Solder KR-19, KR-19RMA

- Soldering iron

Recommended power consumption is between 30 W to 40 W. /

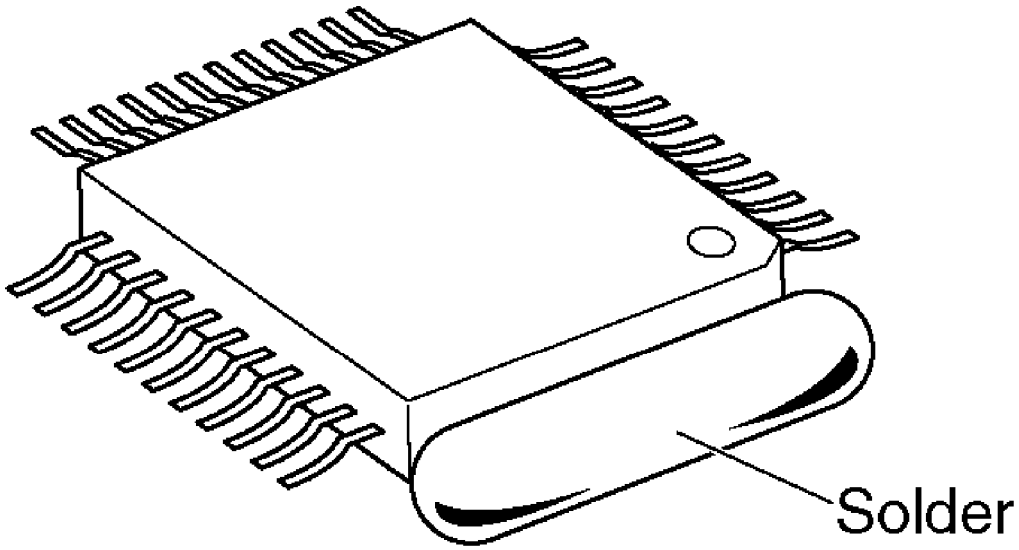
Temperature of Copper Rod 662 ± 50°F (350 ± 10°C) / (An expert may handle a 60~80 W iron, but a beginner might damage the foil by overheating.)

- Flux / HI115 Specific gravity 0.863 / (Original flux should be replaced daily.)

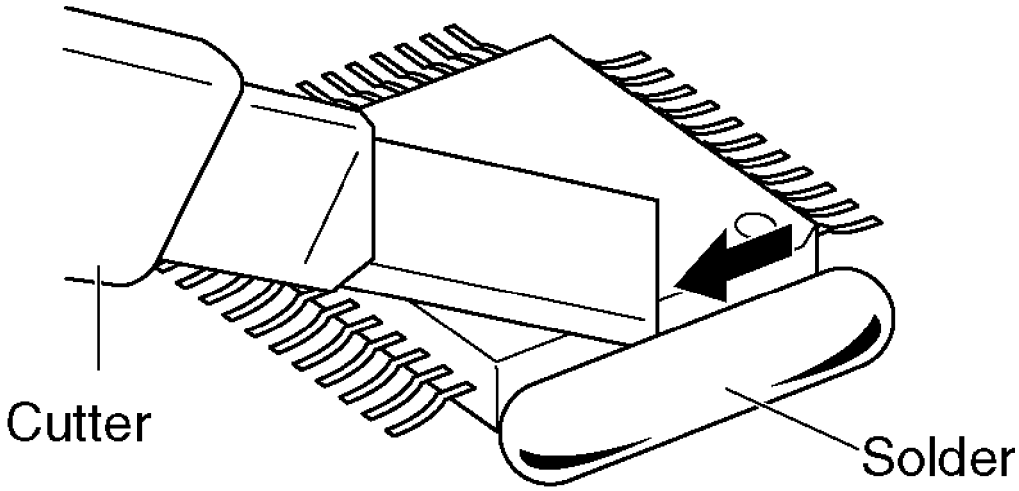
5.2. FLAT PACKAGE IC REMOVAL PROCEDURE

1. Put plenty of solder on the IC pins so that the pins can be completely covered.

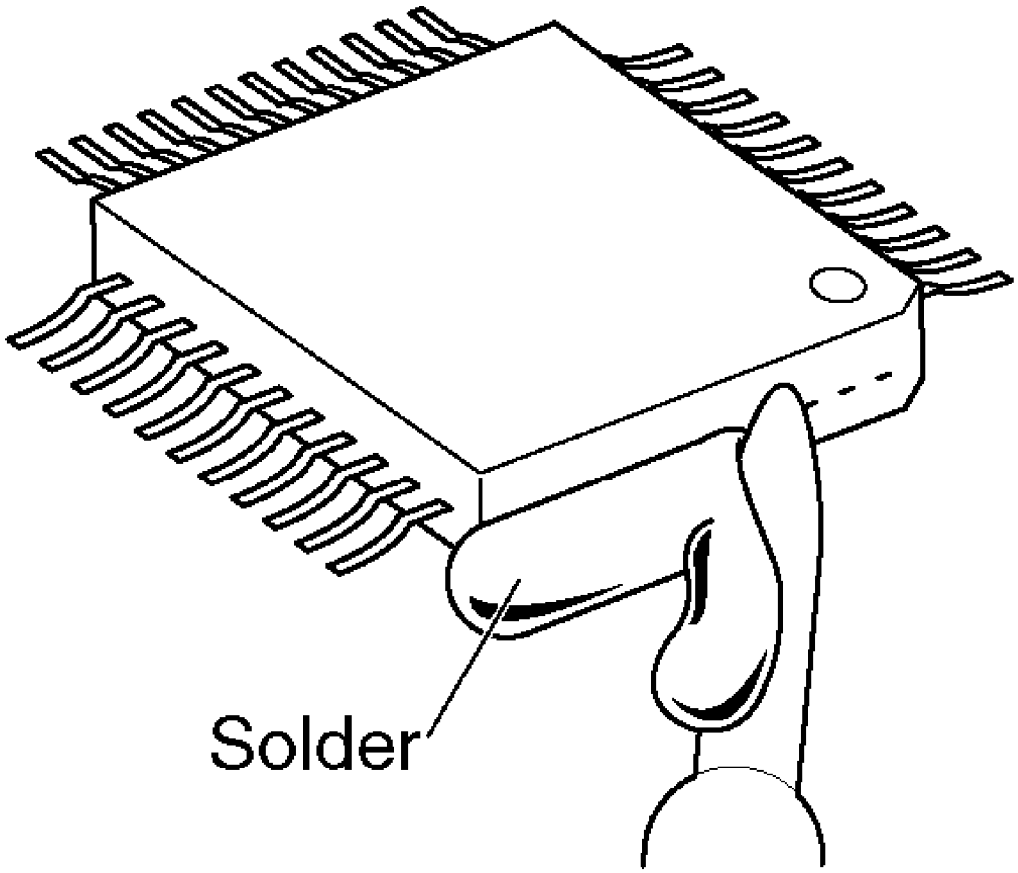
Note:
If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



2. Make a few cuts into the joint (between the IC and its pins) first and then cut off the pins thoroughly.



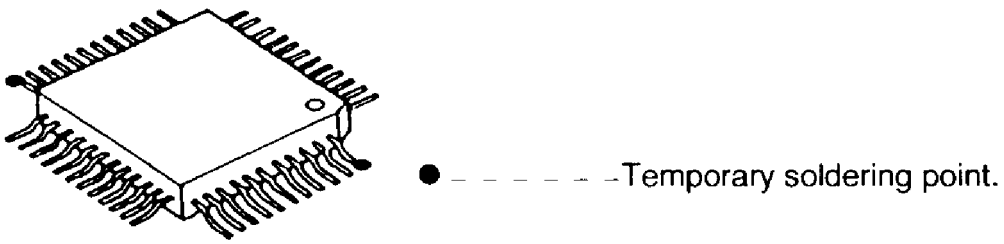
3. While the solder melts, remove it together with the IC pins.



When you attach a new IC to the board, remove all solder left on the land with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

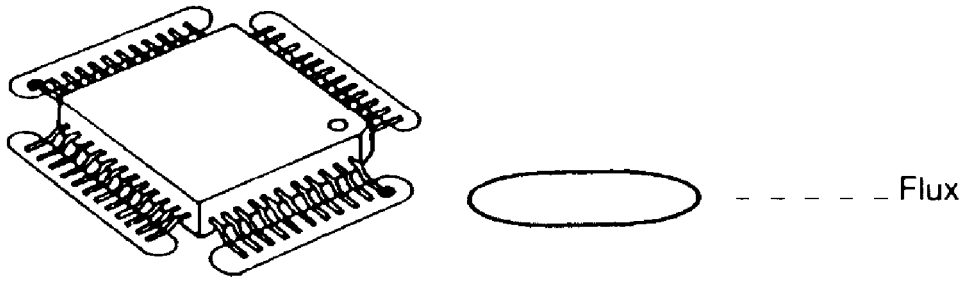
5.3. FLAT PACKAGE IC INSTALLATION PROCEDURE

1. Temporarily fix the FLAT PACKAGE IC, soldering the two marked pins.

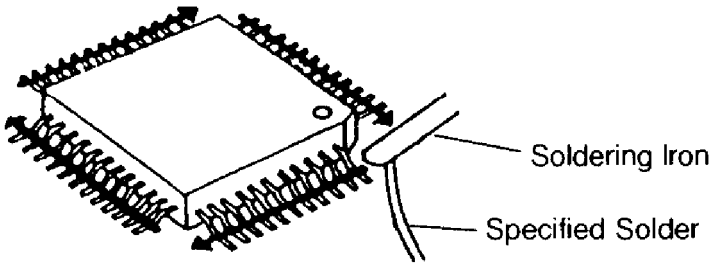


***Check the accuracy of the IC setting with the corresponding soldering foil.**

2. Apply flux to all pins of the FLAT PACKAGE IC.

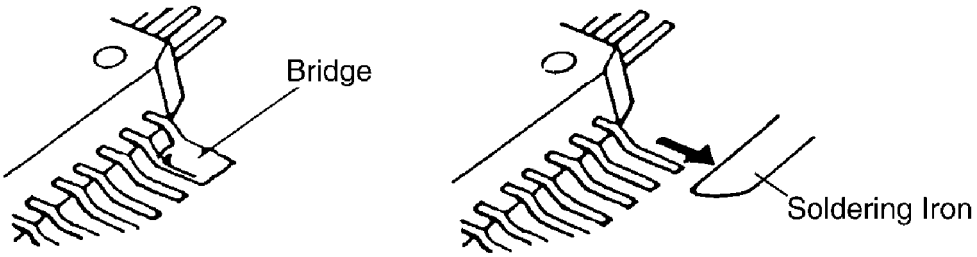


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



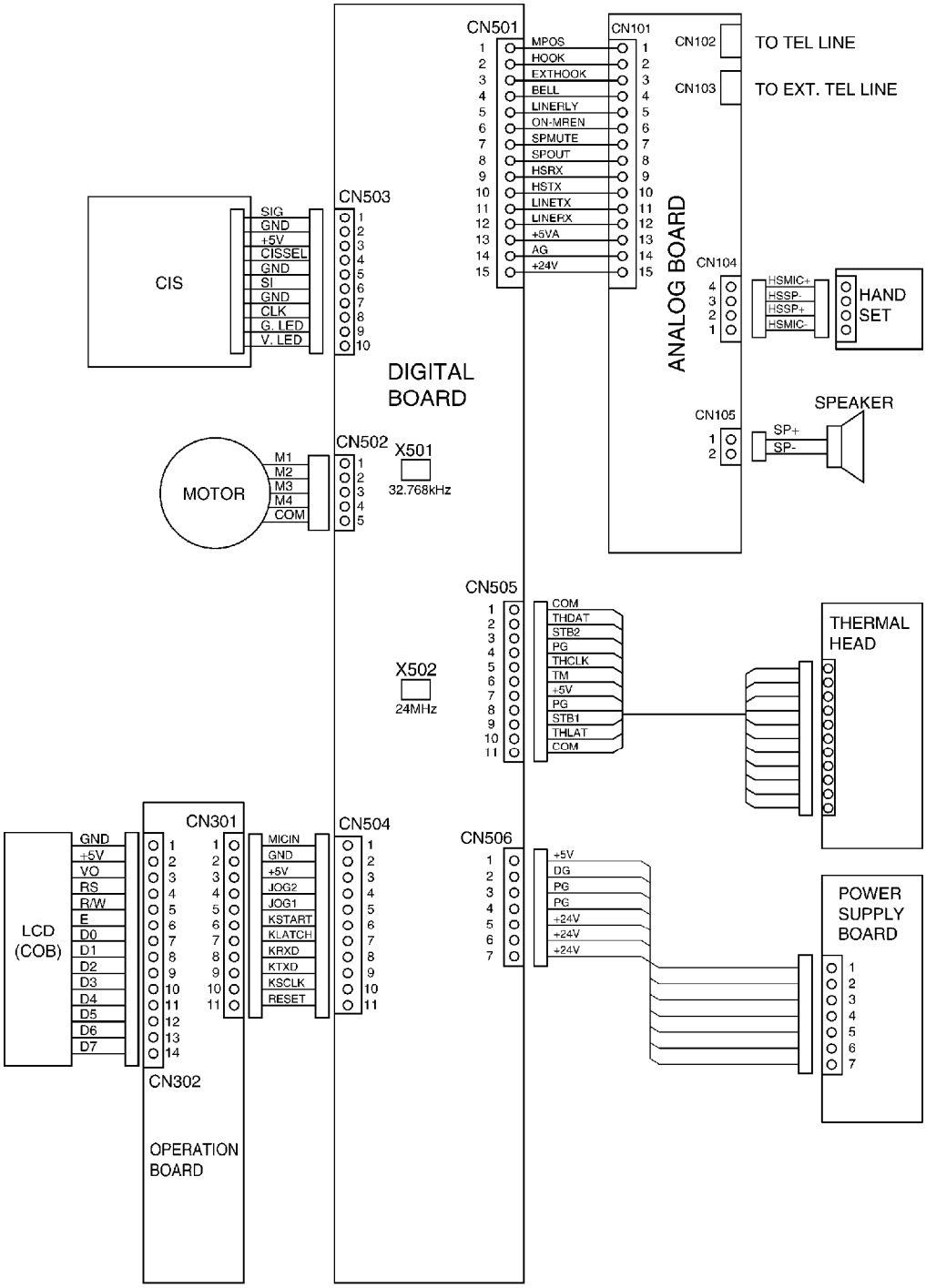
5.4. BRIDGE MODIFICATION PROCEDURE

1. Lightly resolder the bridged portion.
2. Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



6. CIRCUIT OPERATIONS

6.1. CONNECTION DIAGRAM



6.2. GENERAL BLOCK DIAGRAM

The following is an outline of each device IC on the digital board. (Refer to 6.2.1. GENERAL BLOCK DIAGRAM().).

1. ASIC (IC501)

Composed mainly of an address decoder and a modem control.

Controls the general FAX operations.
Controls the operation panel I/F.
Controls the thermal head I/F and CIS I/F.
Performs the image processing.
CPU and Real time clock
Provides the reset pulse for each of the major ICs.

2. **ROM (IC502)**
   Contains all of the program instructions on the unit operations.
3. **Static RAM (IC504)**
   This memory is used mainly for the parameter working in the storage area.
4. **Dynamic RAM (IC503)**
   This memory is used mainly for the parameter working in the storage area.
5. **MODEM (IC505)**
   Performs the modulation and the demodulation for FAX communication.
6. **Read Section**
   CIS image sensor to read transmitted documents.
7. **Motor Driver (IC508)**
   Drives the transmission motor and the reception motor.
8. **Thermal Head**
   Contains heat-emitting elements for dot matrix image printing.
9. **Analog Board**
   Composed of ITS circuit and NCU circuit.
10. **Sensor Section**
    Composed of a cover open and film end switch, a document set switch, a document top switch, a paper top sensor and a motor position switch.
11. **Power Supply Board Switching Section**
    Supplies +5V and +24V to the unit.

6.2.1. GENERAL BLOCK DIAGRAM

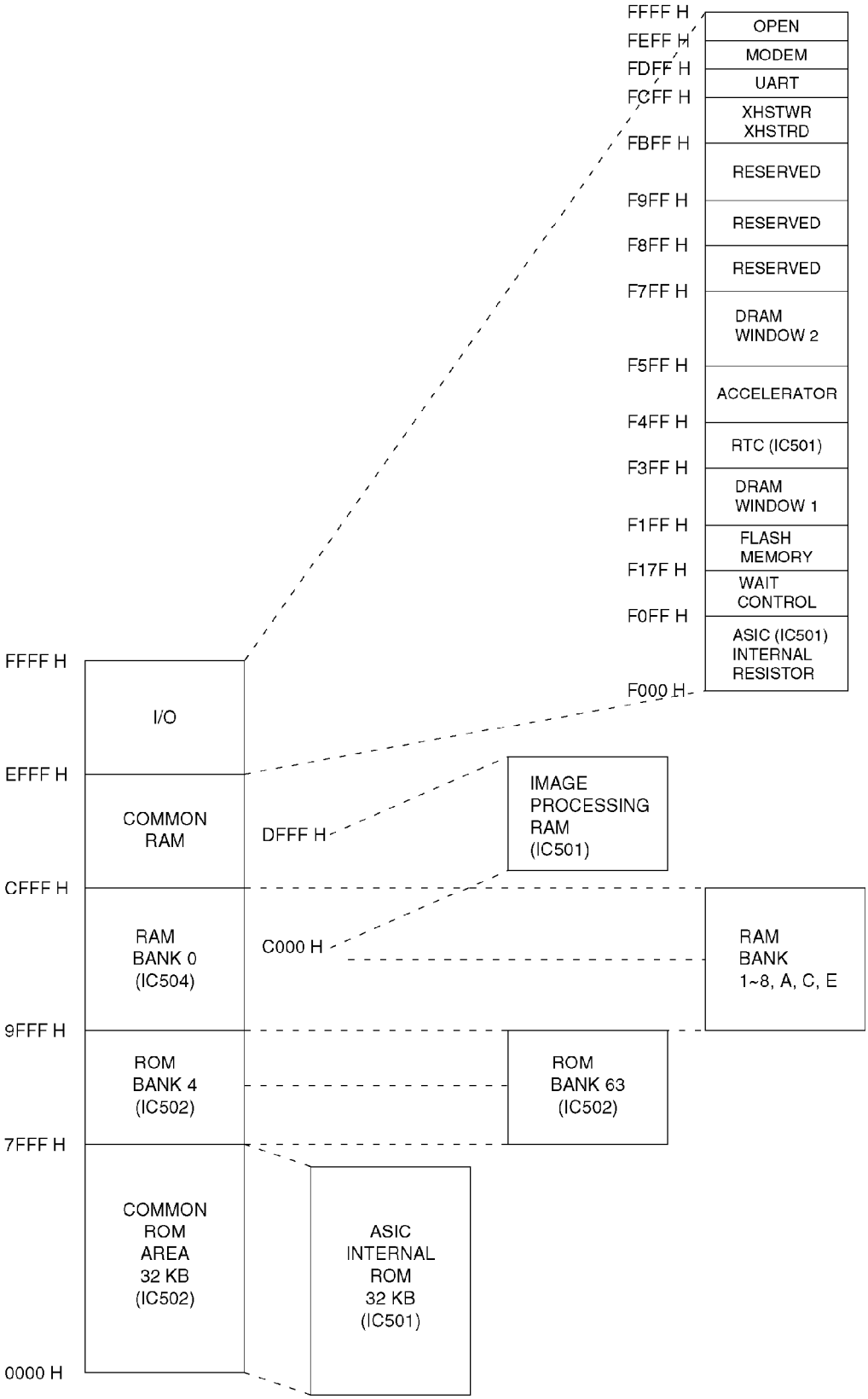
CROSS REFERENCE:

6.7.1. ANALOG UNIT BLOCK DIAGRAM()

6.3. CONTROL SECTION

6.3.1. BLOCK DIAGRAM

6.3.2. MEMORY MAP

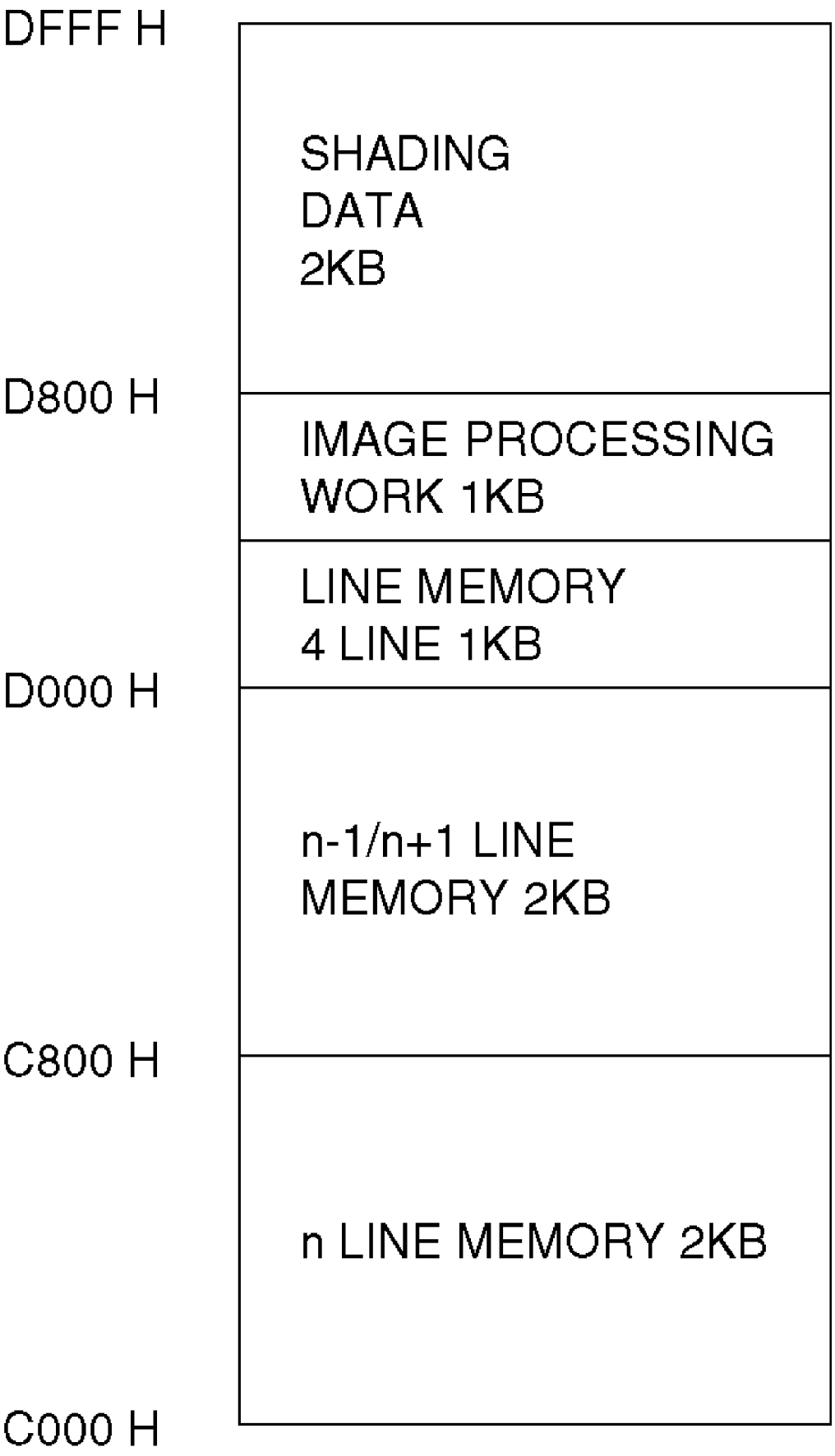


6.3.3. ASIC (IC501)

This custom IC is used for the general FAX operations.

1. **CPU:**
   This model uses a Z80 equivalent to the CPU operating at 8 MHz. Most of the peripheral functions are performed by custom-designed LSIs. Therefore, the CPU only works for processing the results.
2. **RTC:**
   Real Time Clock
3. **DECODER:**
   Decodes the address.
4. **ROM/RAM I/F:**
   Controls the SELECT signal of ROM or RAM and the bank switching.
5. **CIS I/F:**
   Controls the document reading.
6. **IMAGE DATA RAM:**
   This memory is programmed into the ASIC and uses 8 KB for the image processing. (See Fig. A.*)
7. **THERMAL HEAD I/F:**
   Transmits the recorded data to the thermal head.
8. **MOTOR I/F:**
   Controls the transmission motor which feeds the document.
   Controls the receiving motor which feeds the recording paper.
9. **OPERATION PANEL I/F:**
   Serial interface with Operation Panel.
10. **I/O PORT:**
    I/O Port Interface.
11. **ANALOG UNIT:**
    Electronic volume for the handset and the monitor.
    Sends beep tones, etc.

Fig. A


DFFF H
SHADING
DATA
2KB
D800 H
IMAGE PROCESSING
WORK 1KB
LINE MEMORY
4 LINE 1KB
D000 H
n-1/n+1 LINE
MEMORY 2KB
C800 H
n LINE MEMORY 2KB
C000 H

(CPU ADDRESS)

Note*:
This memory is incorporated into the ASIC (IC501) and used for the image processing.
Fig. A shows the memory map of the Image Data RAM.

6.3.4. ROM (IC502)

This 512KB ROM (EPROM or MASKROM) carries a common area of 32KB and bank areas which each have 8KB (BK4~BK63). The addresses from 0000H to 7FFFH are for the common area and from 8000H to 9FFFH are for the bank areas.

6.3.5. STATIC RAM (IC504)

This 32KB RAM carries a common area of 8KB and bank areas which each have 12KB. The addresses from 0000H to EFFFH are for the common area and from A000H to CFFFH are for the bank area.

6.3.6. DYNAMIC RAM (IC503)

The DRAM serves as CPU and receives memory.
The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

Descriptions of Pin Distribution (IC501)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
1	AIN1	A	3.3V	CCD IMAGE SIGNAL INPUT
2	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
3	AIN3	A	3.3V	----------
4	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
5	VSSB		GND	POWER SOURCE (ANALOG GND)
6	VDDB		3.3V	POWER SOURCE (ANALOG +3.3V)
7	VDD(3.3V/B)		3.3V/BATT	POWER SOURCE (+3.3V/LITHIUM BATTERY)
8	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
10	VSS		GND	GND
11	XBACEN	I	5V/BATT	BACKUP ENABLE
12	VDD (5V/B)		5V/BATT	POWER SOURCE (+5V/LITHIUM BATTERY)
13	XRAMCS	O	5V/BATT	RAM (IC504) CHIP SELECT
14	FTG	O	5V	SH SIGNAL OUTPUT FOR CIS (SI)
15	F1	O	5V	01 SIGNAL OUTPUT FOR CIS (CLK)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
16	F2/OP	O	5V	OUTPUT PORT (HSTXMUTE)
17	FR/OP	O	5V	OUTPUT PORT (ON-MREN)
18	CPC	I	5V	INPUT PORT (CISSEL)
19	VDD (5V)		5V	POWER SOURCE (+5V)
20	VSS		GND	POWER SOURCE (GND)
21	RVN	I	5V	INPUT PORT (MPOS)
22	IRDATXD/IOP	O	5V	OUTPUT PORT (CISON)
23	IRDARXD/ IOP80	O	5V	OUTPUT PORT (THON)
24	TXD/IOP	O	5V	OUTPUT PORT (TONFIEN)
25	RXD/IOP	O	5V	OUTPUT PORT (MDMRXEN)
26	XRTS/IOP	O	5V	OUTPUT PORT (MDMTXEN)
27	XCTS/IOP	O	5V	OUTPUT PORT (OF-MREN)
28	MIDAT/IOP	O	5V	OUTPUT PORT (HSRXEN)
29	MICLK/IOP	O	5V	OUTPUT PORT (SPMUTE)
30	TONE1	A	5V	TONE OUTPUT
31	TONE2	A	5V	TONE OUTPUT
32	VOLUREF	A	5V	ANALOG REF VOLTAGE
33	VOLUOUT	A	5V	VOLUME OUTPUT
34	VOLUIN	A	5V	VOLUME INPUT
35	MILAT/IOP	I	5V	INPUT PORT (HOOK)
36	XNMI	I	5V	HIGH FIXED
37	FMEMDO/IOP	O	5V	OUTPUT PORT (CISLED)
38	FMEMDI/IOP	O	5V	OUTPUT PORT (LINERLY)
39	FMEMCLK/IOP	I	5V	INPUT PORT (BELL)
40	VSS		GND	POWER SOURCE (GND)
41	VDD (5V)		5V	POWER SOURCE (+5V)
42	20KOSC/IOP	I	5V	INPUT PORT (EXTHOOK)
43	XWAIT	I	5V	INPUT PORT (FILM)
44	HSTRD/IOP	I	5V	INPUT PORT (PTOP)
45	HSTWR/IOP	O	5V	OUTPUT PORT (PTOP-EN)
46	XOPRBE	O	5V	OPRESET
47	ADR15	O	5V	CPU ADDRESS BUS 15 (NOT USED)
48	ADR14	O	5V	CPU ADDRESS BUS 14 (NOT USED)
49	ADR13	O	5V	CPU ADDRESS BUS 13 (NOT USED)
50	VDD (3.3V)		3.3V	POWER SOURCE (+3.3V)
51	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
52	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
53	VSS		GND	POWER SOURCE (GND)
54	VDD (5V)		5V	POWER SOURCE (+5V)
55	XTEST	O	5V	24MHz CLOCK
56	TEST1	I	5V	HIGH FIXED
57	TEST2	I	5V	HIGH FIXED
58	TEST3	I	5V	HIGH FIXED

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
59	TEST4	I	5V	HIGH FIXED
60	XMDMINT	I	5V	MODEM INTERRUPT
61	XMDMCS	O	5V	MODEM CHIP SELECT
62	VSS		GND	POWER SOURCE (GND)
63	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
64	XRAS/IOP	O	5V	DRAM (IC503) ROW ADDRESS STROB
65	XCAS1/IOP	O	5V	DRAM (IC503) CULUM ADDRESS STR
66	XCAS2/IOP	O	5V	OUTPUT PORT (MDMRST)
67	XRESCS2	O	5V	NOT USED
68	DB3	I/O	5V	CPU DATA BUS 3
69	DB2	I/O	5V	CPU DATA BUS 2
70	DB4	I/O	5V	CPU DATA BUS 4
71	DB1	I/O	5V	CPU DATA BUS 1
72	DB5	I/O	5V	CPU DATA BUS 5
73	DB0	I/O	5V	CPU DATA BUS 0
74	DB6	I/O	5V	CPU DATA BUS 6
75	VSS		GND	POWER SOURCE (GND)
76	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
77	DB7	I/O	5V	CPU DATA BUS 7
78	XROMCS	I/O	5V	ROM (IC502) CHIP SELECT
79	RD	O	5V	CPU RD
80	WR	O	5V	CPU WR
81	VSS		GND	POWER SOURCE (GND)
82	VDD (5V)		5V	POWER SOURCE (5V)
83	ADR0	O	5V	CPU ADDRESS BUS 0
84	ADR1	O	5V	CPU ADDRESS BUS 1
85	ADR2	O	5V	CPU ADDRESS BUS 2
86	ADR3	O	5V	CPU ADDRESS BUS 3
87	ADR4	O	5V	CPU ADDRESS BUS 4
88	ADR5	O	5V	CPU ADDRESS BUS 5
89	ADR6	O	5V	CPU ADDRESS BUS 6
90	ADR7	O	5V	CPU ADDRESS BUS 7
91	ADR8	O	5V	CPU ADDRESS BUS 8
92	ADR9	O	5V	CPU ADDRESS 9
93	ADR10	O	5V	CPU ADDRESS 10
94	ADR11	O	5V	CPU ADDRESS 11
95	ADR12	O	5V	CPU ADDRESS 12
96	VSS		GND	POWER SOURCE (GND)
97	VDD (5V)		5V	POWER SOURCE (+5V)
98	RBA0	O	5V	ROM/RAM BANK ADDRESS 0
99	RBA1	O	5V	ROM/RAM BANK ADDRESS 1
100	RBA2	O	5V	ROM/RAM BANK ADDRESS 2
101	RBA3	O	5V	ROM/RAM BANK ADDRESS 3
102	RBA4	O	5V	ROM/RAM BANK ADDRESS 4

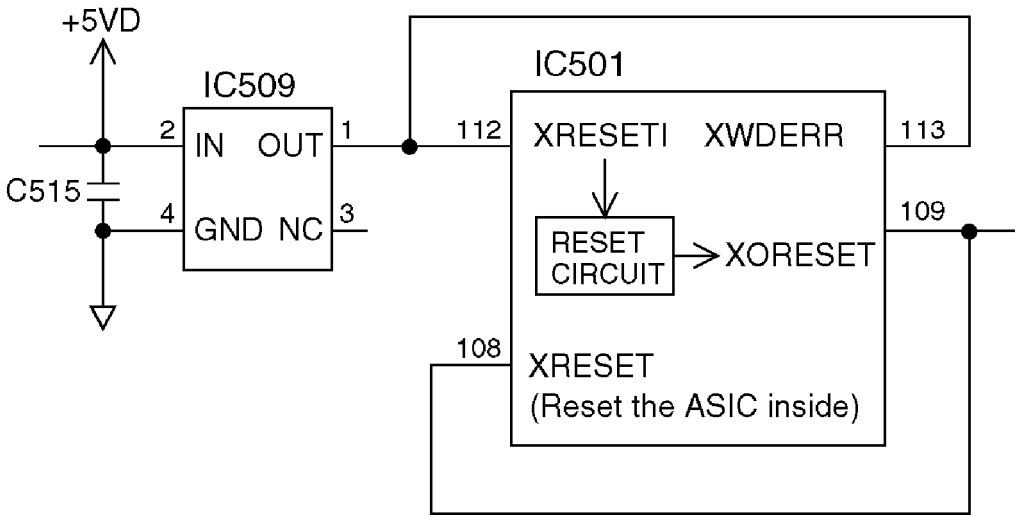
NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
103	RBA5	O	5V	ROM/RAM BANK ADDRESS 5
104	RBA6/IOP96	O	5V	OUTPUT PORT(TONE2EN)
105	STB1	O	5V	STROBE SIGNAL OUTPUT TO THERM HEAD
106	STB2	O	5V	STROBE SIGNAL OUTPUT TO THERM HEAD
107	STB3	O	5V	STROBE SIGNAL OUTPUT TO THERM HEAD
108	XRESET	I	5V	RESET INPUT
109	XORESET	O	5V	RESET OUTPUT
110	VDD (5V)		5V	POWER SOURCE (+5V)
111	VSS		GND	POWER SOURCE (GND)
112	XRESETI	I	5V	RESET INPUT
113	WDERR	O	5V	WATCHED ERROR OUTPUT SIGNAL
114	THDAT	O	5V	RECORDED IMAGE OUTPUT
115	THCLK	O	5V	CLOCK OUTPUT FOR DATA TRANSFE
116	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
117	VSS		GND	POWER SOURCE (GND)
118	THLAT	O	5V	PULSE OUTPUT FOR DATA LATCH
119	STBNP	I	5V	INPUT PORT (TEST)
120	RM0/IOP	O	5V	OUTPUT PORT (A)
121	RM1/IOP	I	5V	INPUT PORT (JOG1)
122	RM2/IOP	I	5V	INPUT PORT (JOG2)
123	RM3/IOP	O	5V	OUTPUT PORT (B)
124	RXE/IOP	I	5V	INPUT PORT (NOT USED) PULL DOWI
125	TMO	O	5V	MOTOR A PHASE
126	VDD (5V)		5V	POWER SOURCE (+5V)
127	VSS		GND	POWER SOURCE (GND)
128	TM1/IOP	O	5V	MOTOR B PHASE
129	TM2/IOP	O	5V	MOTOR /A PHASE
130	TM3/IOP	O	5V	MOTOR /B PHASE
131	TXE/IOP	O	5V	MOTOR ENABLE SIGNAL
132	KSTART	O	5V	OPERATION PANEL CONTROL
133	KLATCH	O	5V	OPERATION PANEL CONTROL
134	KSCLK	O	5V	OPERATION PANEL CONTROL
135	KTXD	O	5V	OPERATION PANEL CONTROL
136	KRXD	I	5V	OPERATION PANEL CONTROL
137	ADSEL1	O	5V	CHANNEL SELECT SIGNAL FOR AIN2
138	VSSC		GND	POWER SOURCE (ANALOG GND)
139	VDDC		3.3V	POWER SOURCE (ANALOG +3.3V)
140	VSSA		GND	POWER SOURCE (ANALOG GND)
141	VDDA		3.3V	POWER SOURCE (ANALOG +3.3V)
142	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
143	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
144	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT

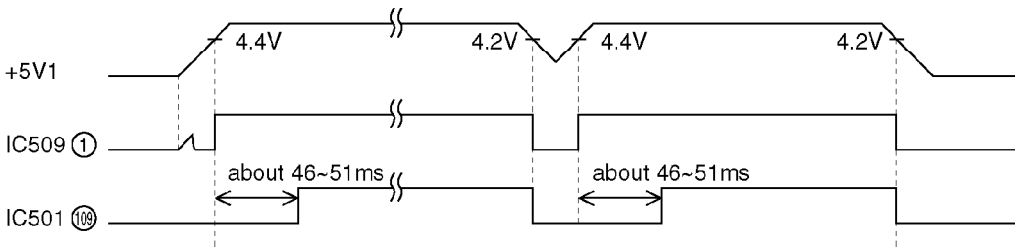
6.3.7. RESET CIRCUIT (WATCH DOG TIMER)

The output signal from pin 1 of the voltage detect IC (IC509) is input to the ASIC (IC501) 112 pin. Then the output signal from pin 109 of the ASIC (IC501) resets the ASIC.

Circuit Diagram



1. During a momentary power interruption, a positive reset pulse of 46~51 msec is generated and the system is reset completely.



2. When pin 108 and 109 of IC501 become low level, they will prohibit the SRAM (IC504) from changing data.
The SRAM (IC504) will go into the backup mode, when they are backed up by a lithium battery.

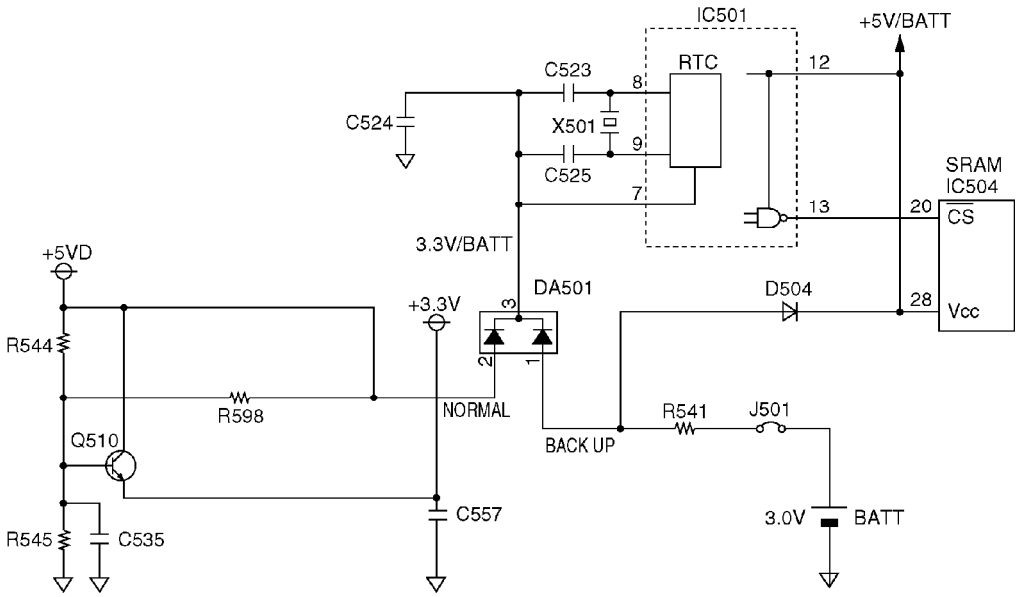
3. The watch dog timer, built-in the ASIC (IC501), is initialized by the CPU about every 1.5 ms.
When a watch dog error occurs, pin 113 of the ASIC (IC501)

becomes low level.
The terminal of the 'WDERR' signal is connected to the reset line, so the 'WDERR' signal works as the reset signal.

6.3.8. SRAM AND RTC BACKUP CIRCUIT

1. **Function**
   This unit has a lithium battery (BAT501) which works for the SRAM (IC504) and Real Time Clock IC (RTC: inside IC501).
   The user parameters for autodial numbers, the system setup data and others are stored in the SRAM (IC504).
   The RTC continues to work, backed up by a lithium battery even when the power switch is OFF.
2. **SRAM (IC504) Backup Circuit Operation**
   When the power switch is turned ON, power is supplied through pin 12 of IC501 to the SRAM (IC504). At this time, the voltage at pin 28 of the SRAM is 5V. When the power switch is turned OFF, the BAT501 supplies power to the SRAM through J501, R541 and D504. The voltage at pin 28 of the SRAM is about +2.5V. When the power switch is OFF and the voltage of +5V decreases, the voltage detect IC (IC507) outputs "Low" level and the IC501 outputs the reset signal. Pin 28 of the SRAM becomes roughly the same voltage as the battery voltage. At this point, pin 20 (CS) of IC504 becomes high level, causing the SRAM to go into the backup mode, in which the power consumption is lower.
3. **RTC Inside (IC501) Backup Circuit Operation**
   When the power switch is turned ON, power is supplied through DA501 to the RTC (inside IC501). At this time, the voltage at pin 7 of the IC501 is +3.3V. When the power switch is turned OFF, the BAT501 supplies power to RTC through DA501. Thevoltage at pin 7 of IC501 is about +2.5V. When the power switch is OFF and the voltage of +3.3V decreases, pin 7 of RTC (IC501) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram



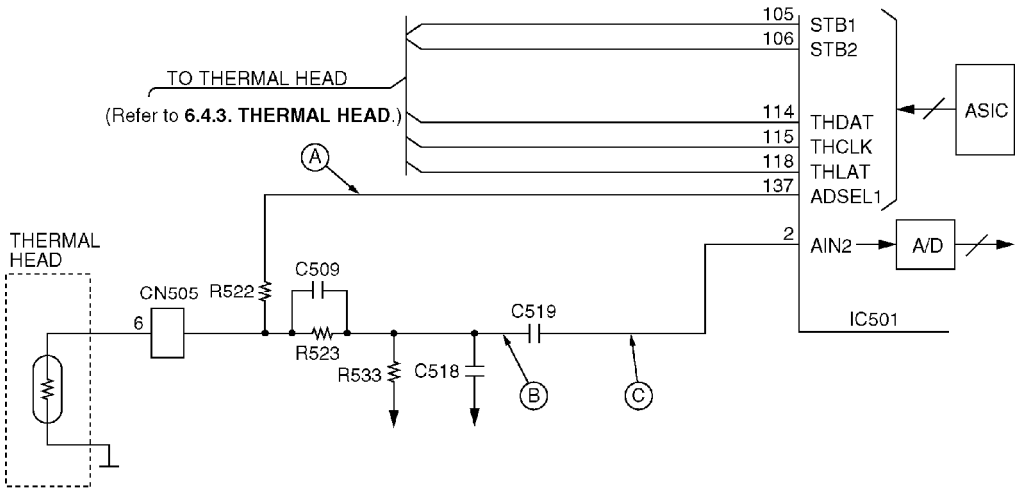
6.3.9. SUPERVISION CIRCUIT FOR THE THERMAL HEAD TEMPERATURE

1. Function

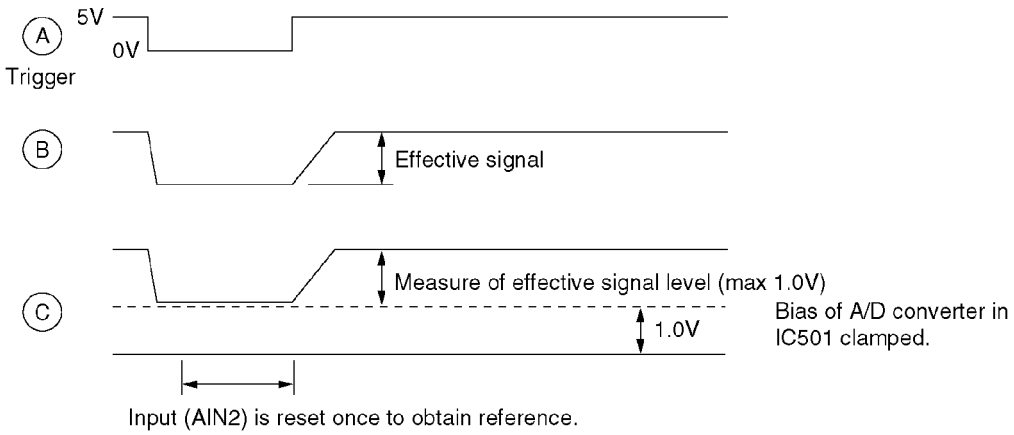
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 137 of IC501 becomes a low level. Then when it becomes a high level, it triggers point A In point C, according to the voltage output time, the thermal head's temperature is detected.

After the thermal head temperature is converted to voltage in B, it is then changed to digital data in the A/D converter inside IC501. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



Timing Chart



CROSS REFERENCE:
6.4.3. THERMAL HEAD()

6.4. FACSIMILE SECTION

6.4.1. IMAGE DATA FLOW DURING FACSIMILE OPERATION

Copy (Fine, Super-Fine, Half Tone)

1. **Line information is read by CIS (to be used as the reference white level) via route1, and is input to IC501. Refer to 6.4.2. BLOCK DIAGRAM()**
2. **In IC501, the data is adjusted to a suitable level for A/D conversion in the Analog Signal Processing Section, and via route2 it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route3. Then via**

route4 and route5, it is stored in RAM as shading data.

3. The draft's information that is read by CIS is input to IC501 via route1. After it is adjusted to a suitable level for A/D conversion via route2, the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via route6 and route7, is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Then via routes4 and 5, they are stored in RAM.
4. The white/black data stored as above via routes6 and 8 is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route9 and is printed out on recording paper.

Note:
Standard : Reads 3.58 times/mm
Fine : Reads 7.7 times/mm
Super-Fine : Reads 15.4 times/mm

Transmission

1. Same processing as Copy items 1 - 3.
2. The data stored in the RAM of IC501 is output from IC501 via routes6 and 10, and is stored in the system bus.
   Via route11, it is stored in the communication buffer inside DRAM (IC503).
3. While retreiving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route12, where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

Reception

1. The serial analog image data is received over the telephone lines and input to the modem via the NCU section, where it is

demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route12.

2. The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route12, and is stored in DRAM (IC503) via routes13 and 5.
3. Same processing as Copy item 4.

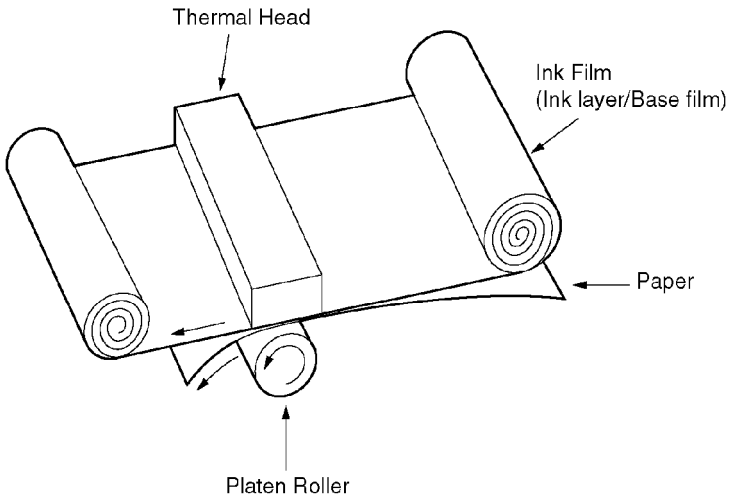
6.4.2. BLOCK DIAGRAM

6.4.3. THERMAL HEAD

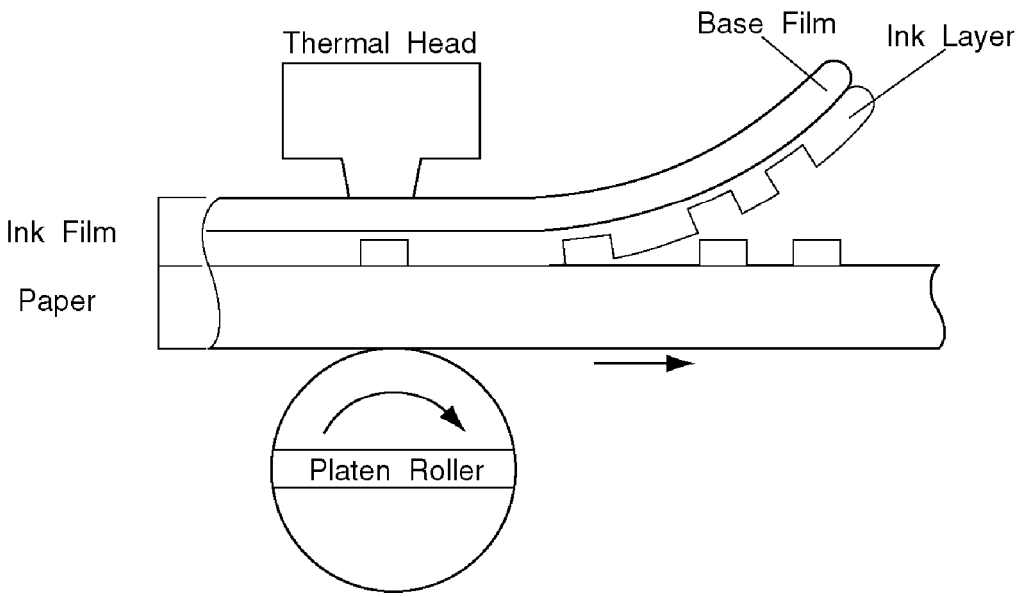
1. Function

   This unit utilizes the state of the art thermal printer technology. The ink film is chemically processed. The ink film is comprised of two parts: an ink layer and a base film. When the thermalhead contacts this ink film, it emits heat momentarily, and the ink layer is melted and transferred to the paper. If this continues, letters and/or diagrams appear, and the original document is reproduced.

COMPOSITION OF THE RECEIVE RECORD SECTION (THERMAL RECORDING FORMAT)



Thermal Transfer



2. Circuit Operation

Refer to the block diagram and the timing chart on the following page.

There are 9 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 192 heat-emitting registers. This means that one line is at a density of 192×9=1728 dots=(8 dots/ mm).

White/Black (white=0, black=1) data in one line increment is synchronized at IC501 pin 115 (THCLK), and sent from IC501 pin 114 (THDAT) to the shift register of the ICs. The shift registers of the 9 ICs are connected in series, and upon the shift of the 1728 dot increment, the shift register becomes filled with data, and a latch pulse is emitted to each IC from IC501 pin 118 (THLAT). With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC501 pins (105, 106), only the dot location of black (=1) among latched data activates the driver, and the current passes to heat the emitting body to cause heat emission.

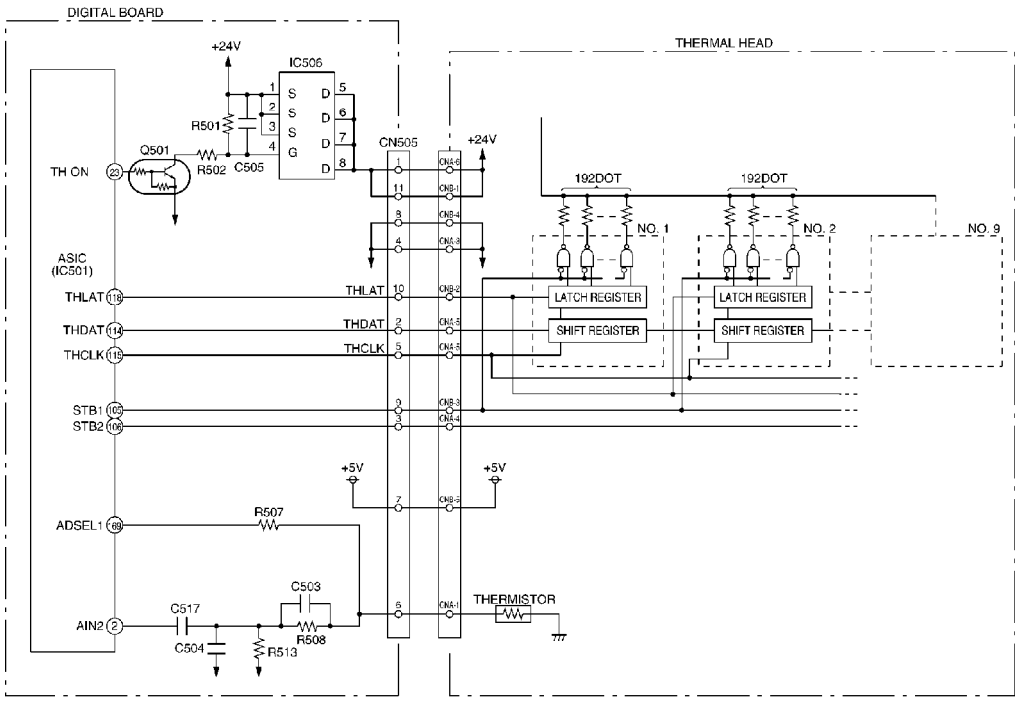
Here, the two line strobes, STB1 and STB2, impress at intervals of 9.216 msec, as required for one-line printout.

The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected

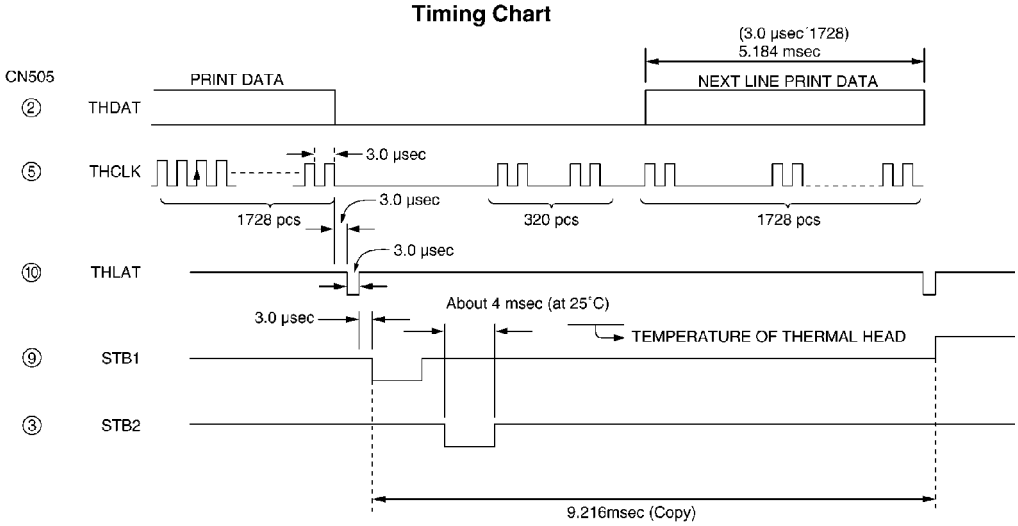
according to IC501 pin 2. Depending on that value, the strobe width is recorded in ROM (IC502). Accordingly, the strobe width is determined.]

When the thermal head is not used, the IC501 (23, THON) becomes low , Q501 turns OFF, IC506 turns OFF, and the +24V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram

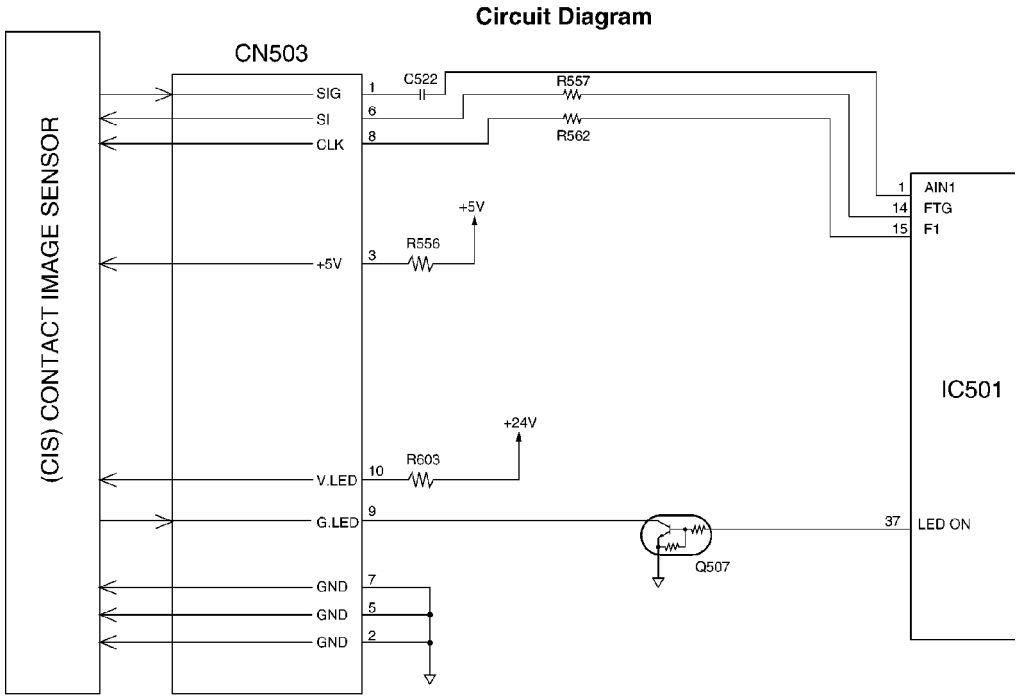


Timing Chart



6.4.4. SCANNING BLOCK

The scanning block of this device consists of a control circuit and a contact image sensor made up of a celfoc lens array, an LED array, and photoelectric conversion elements.



When an original document is inserted and the start button pressed, pin 37 of IC501 goes to a high level and the transistor Q37 turns on.This applies voltage to the LED array to light it. The contact image sensor is driven by each of the FTG-F1 signals output from IC501, and the original image illuminated by the LED array undergoes photoelectric conversion to output an analog image signal (SIG). The analog image signal is input to the system ASIC on AIN1 (pin 1 of IC501) and converted into 8-bit data by the A/D converter inside IC501. Then this signal undergoes digital processing in order to obtain a high-quality image.

6.4.5. STEPPING MOTOR DRIVE CIRCUIT

1. Function

The stepping motor works for both transmission and reception.

2. Motor

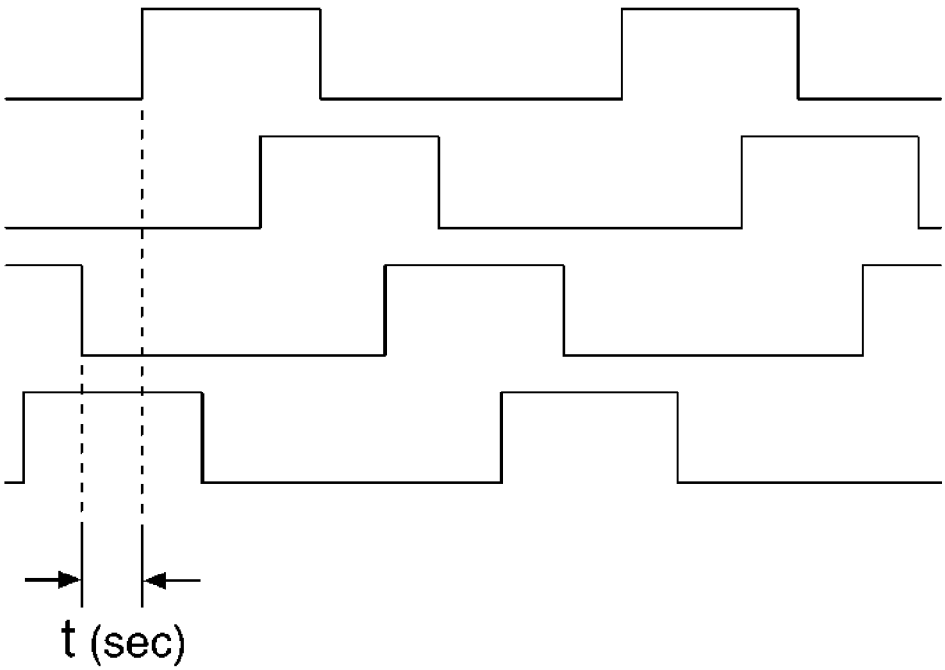
During motor driving, pin 131 of ASIC IC501 becomes a high level, and Q503, Q502 turns ON. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from ASIC IC501 pins, 125, 128~130, causing driver IC508 pins, 15~12 to drive the Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.

The timing chart is below.

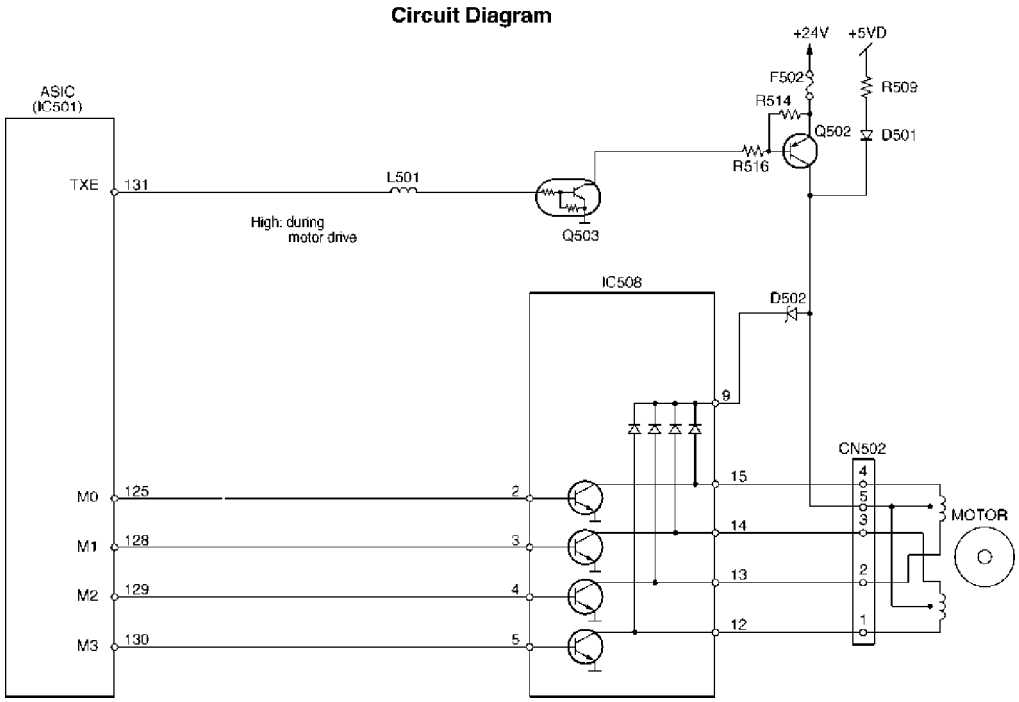
Stepping Monitor Timing Chart

- 1-2 Phase



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Standard or Fine	1-2	432 pps (t=1/432)
	Super Fine	1-2	216 pps (t=1/216)
Paper Feed	———	1-2	432 pps (t=1/432)
Stand-by	———	All phases are currently off.	None



When the motor suspends while it is in the receive mode (about 70~80 msec), pin 131 of ASIC IC501 becomes a low level and Q503 turns OFF. Then Q502 also turns OFF, and instead of +24 V, +5 V is supplied through D501 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors turn OFF. Consequently, the motor current stops.

6.4.6. GEAR SECTION

This model provides a motor-driven gear mechanism for transmitting/copying documents and printing fax data. In this chapter, you will see how the gears work to select and operate a mode and how the gear section, sensors and rollers mechanically work during the main operations (FAX transmission, FAX reception and Copy).

6.4.6.1. MODE SELECTION (See Fig. 1)

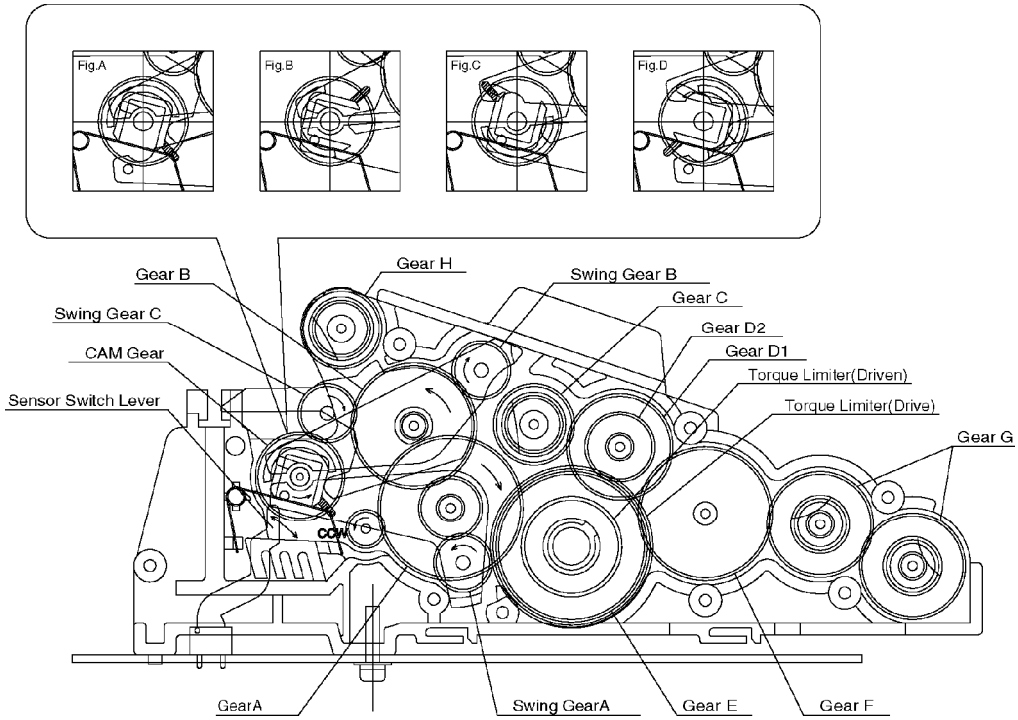
When a motor with Drive Motor Gear attached rotates counterclockwise (CCW), Swing Gear C engages CAM Gear to rotate counterclockwise (CCW). This operation provide four mode options (A: Transmit mode, B: Paper-Pickup mode, C: Receive mode and D: Copy mode) selected by the Sensor Switch. (The Sensor Switch Lever's position in the CAM Gear controlled by the software selects a specific mode.) You can see which mode is selected by confirming the Mode Marker's position as shown in / Fig. 1-a~1-d.

(Ex. If the Mode Marker is in position A, a transmit mode is selected.)

Note:

The arrows show the directions in which the active gears turn around.

Fig. 1: Mode Selection



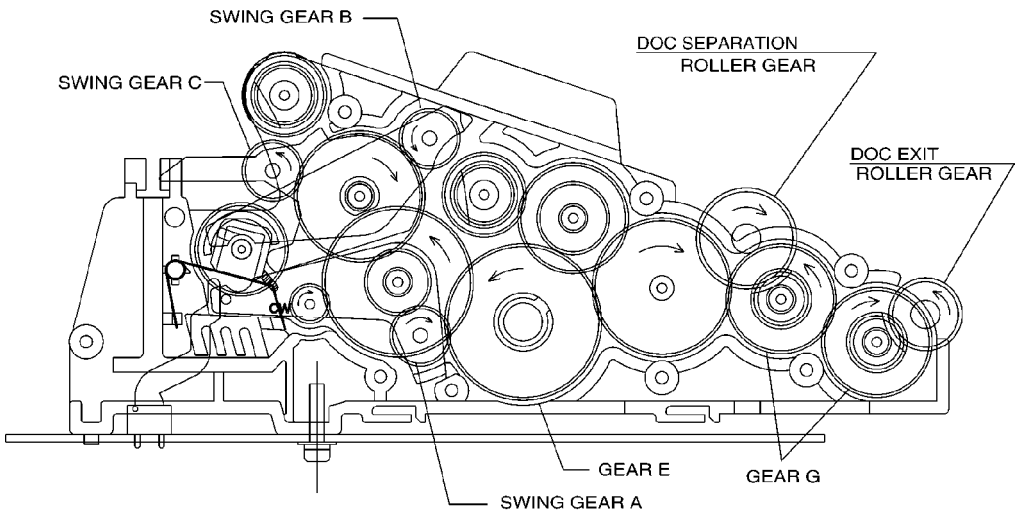
6.4.6.2. MODE OPERATION

Once a mode is selected, the Drive Motor Gear rotates clockwise (CW) and then the controlling positions of Swing Gears A, B and C determine which gears convey their drive power in each mode.

A. Transmit mode (See Fig. A.) :

Swing Gear A engages Gear E and conveys its power to the Separation Roller Gear through Gear G and sets the Separation Roller for feeding documents.

Fig. A: Transmit mode

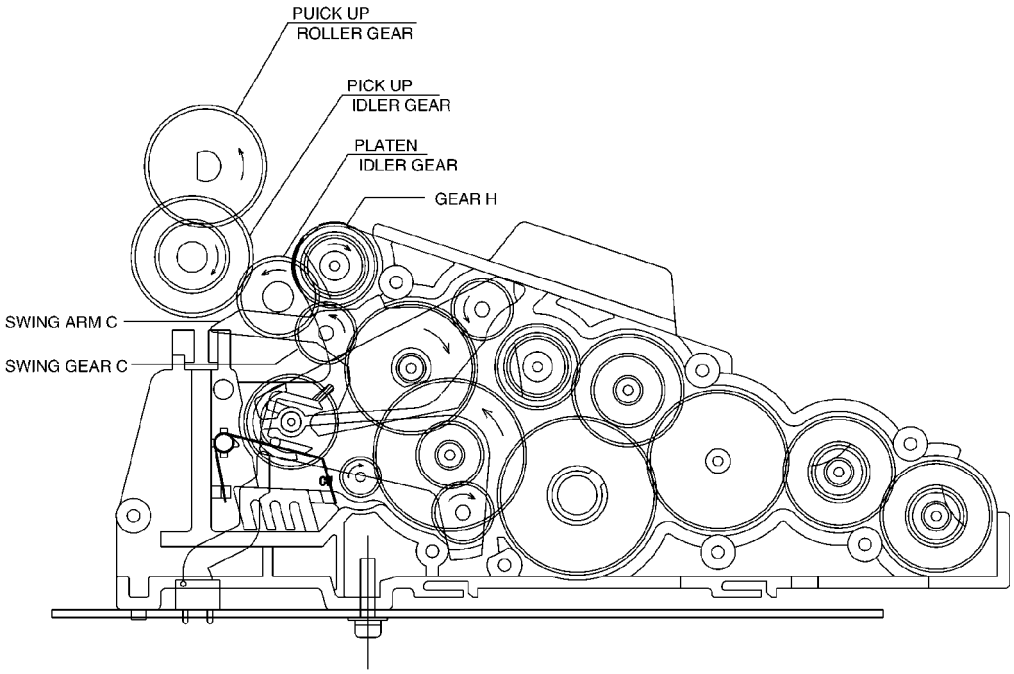


B. Paper-Pickup mode (See Fig. B) :

Swing Gear C engages Gear H and provides its power to the Pick up Roller Gear and Platen Idler

Gear and Pick up Idler Gear. The Gear drive as follows: Swing Arm C → engaging → Gear H → Platen Idler Gear → Pick up Idler Gear → Pickup roller Gear. The Pickup Roller picks up and pre-feeds a recording paper until the recording paper pushes up the Paper Top sensor* lever.

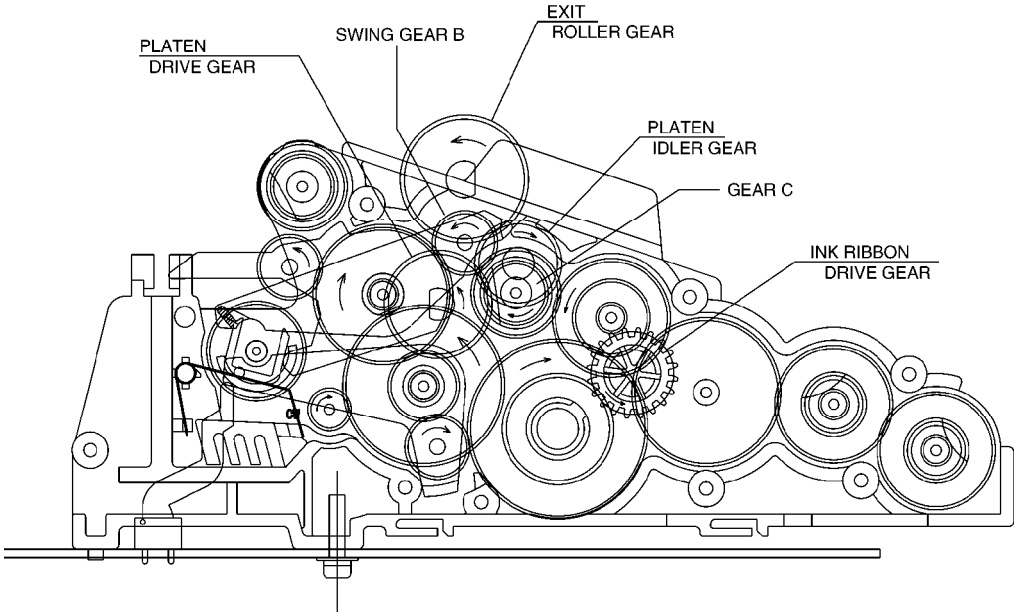
Fig. B: Paper-Pickup mode



Note* :
See "Sensor Location" in 6.5. SENSORS AND SWITCHES().

C. Receive mode (See Fig. C.) :
After paper pick up mode, Swing Gear B engages Gear C and conveys its power to the Platen Roller Gear and Ink Ribbon Drive Gear through Platen Drive Gear. Then, the Platen Roller feeds recording paper for printing the received data.

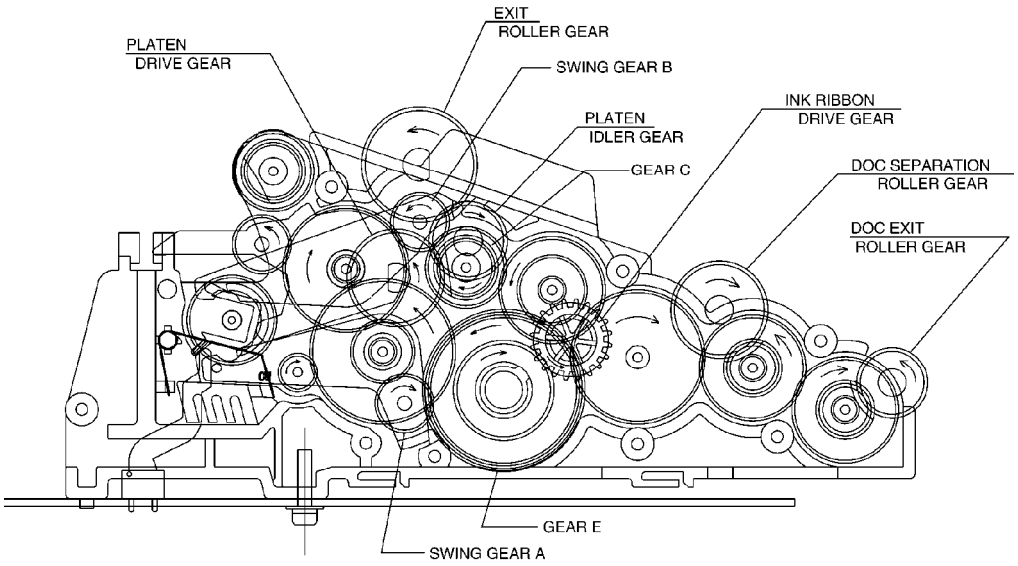
Fig. C: Receive mode



D. Copy mode (See Fig. D.) :

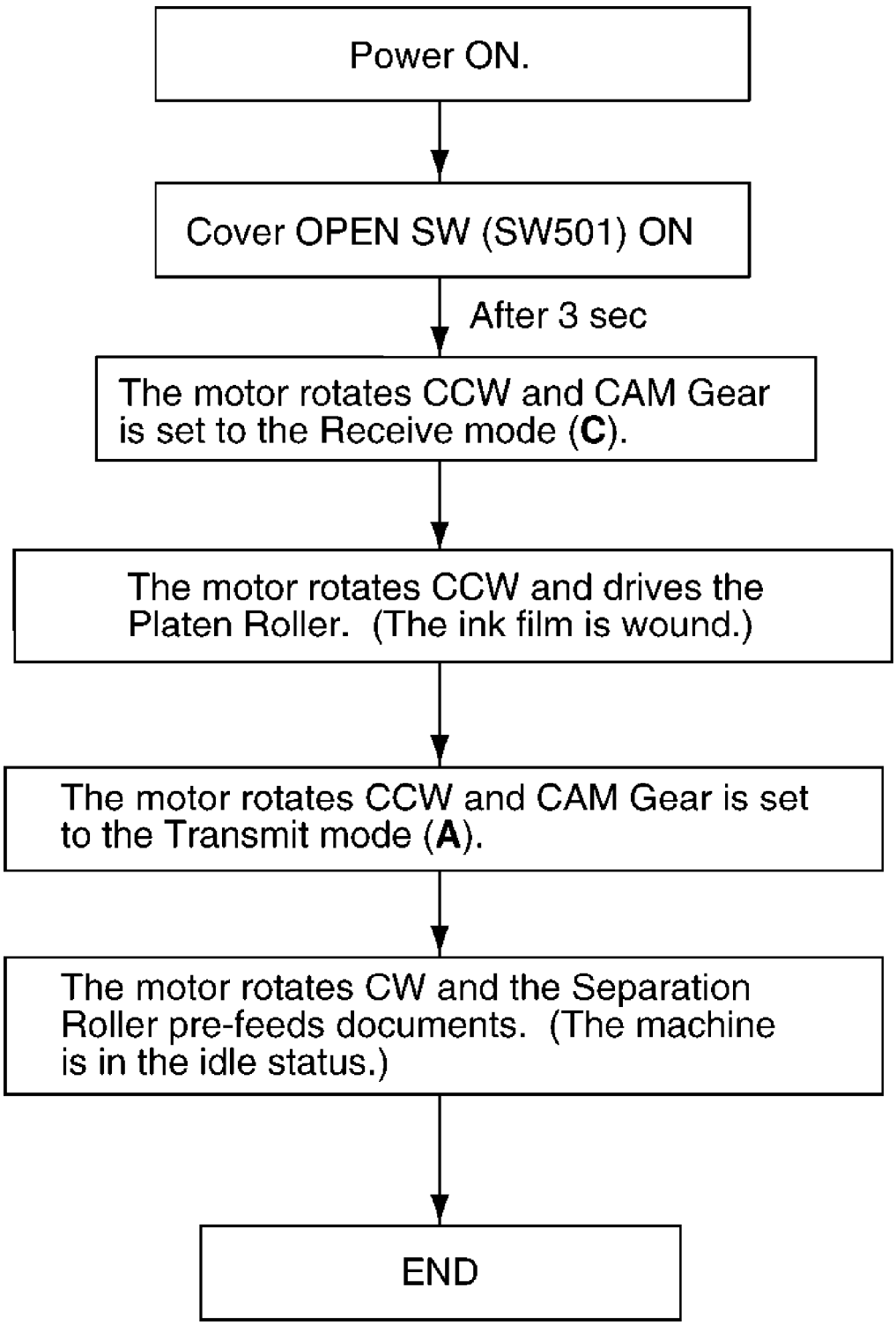
Documents pre-feeding → Transmit mode go → Recording paper feeding → Pick up mode go. Next Swing Gear A and B engages Gear E and Gear C respectively and conveys these power to the Separation Roller Gear and the Platen Roller Gear. Then the Separation Roller feeds documents and the Platen Roller feeds recording paper for printing copier data.

Fig. D: Copy mode



6.4.6.3. MECHANICAL MOVEMENTS IN THE MAIN OPERATIONS (transmitting documents, receiving faxes and copying)

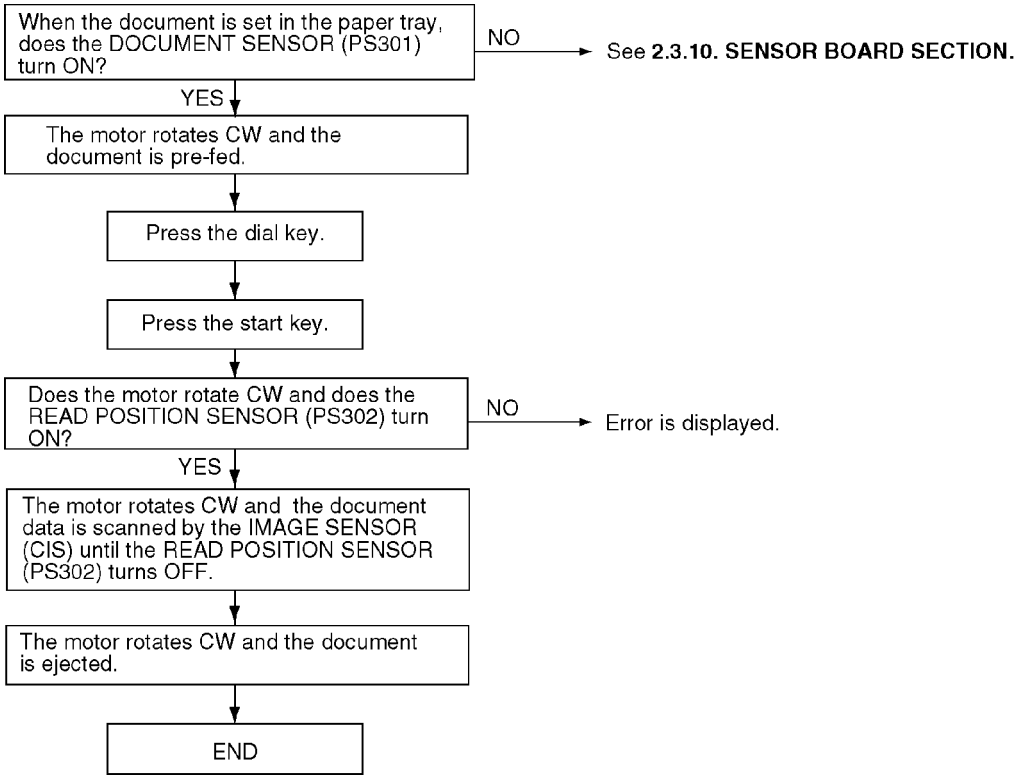
6.4.6.3.1. IDLE STATUS


Power ON.
Cover OPEN SW (SW501) ON
After 3 sec
The motor rotates CCW and CAM Gear is set to the Receive mode (C).
The motor rotates CCW and drives the Platen Roller. (The ink film is wound.)
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
The motor rotates CW and the Separation Roller pre-feeds documents. (The machine is in the idle status.)
END

Note:

See “Sensor Locations” in 6.5. SENSORS AND SWITCHES().

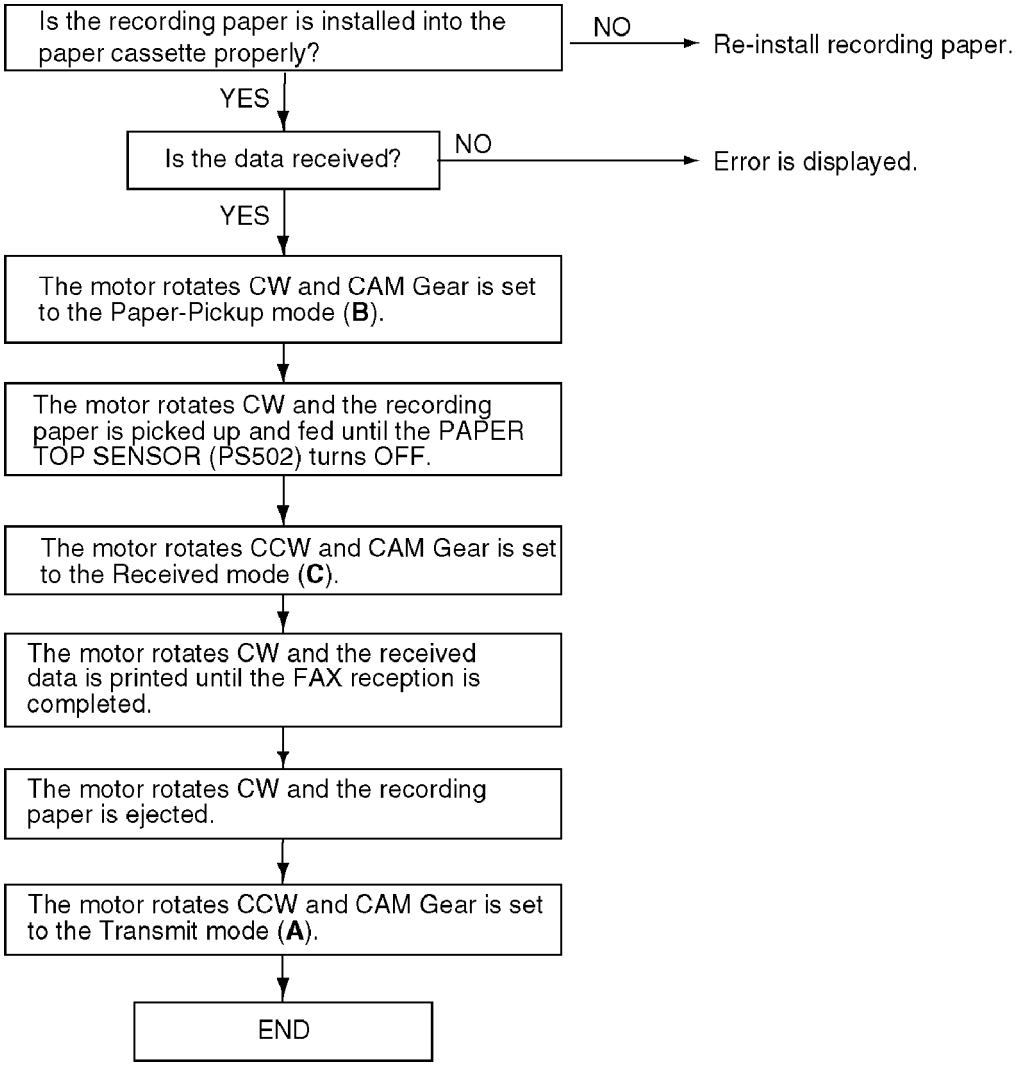
6.4.6.3.2. TRANSMITTING DOCUMENTS


When the document is set in the paper tray, does the DOCUMENT SENSOR (PS301) turn ON?
NO
See 2.3.10. SENSOR BOARD SECTION.
YES
The motor rotates CW and the document is pre-fed.
Press the dial key.
Press the start key.
Does the motor rotate CW and does the READ POSITION SENSOR (PS302) turn ON?
NO
Error is displayed.
YES
The motor rotates CW and the document data is scanned by the IMAGE SENSOR (CIS) until the READ POSITION SENSOR (PS302) turns OFF.
The motor rotates CW and the document is ejected.
END

CROSS REFERENCE:

2.3.10. SENSOR SECTION().

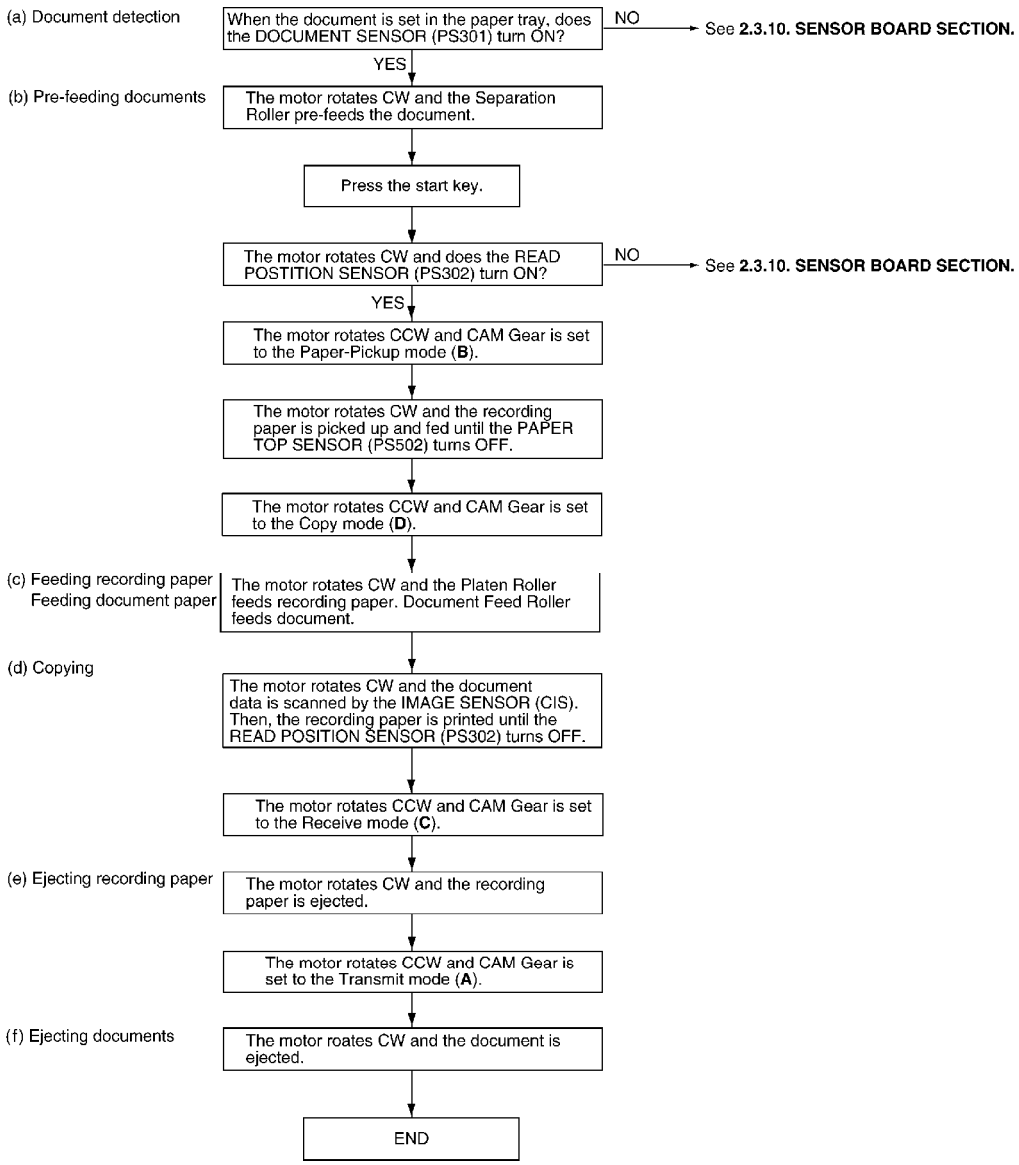
6.4.6.3.3. RECEIVING FAX


Is the recording paper is installed into the paper cassette properly?
NO
Re-install recording paper.
YES
Is the data received?
NO
Error is displayed.
YES
The motor rotates CW and CAM Gear is set to the Paper-Pickup mode (B).
The motor rotates CW and the recording paper is picked up and fed until the PAPER TOP SENSOR (PS502) turns OFF.
The motor rotates CCW and CAM Gear is set to the Received mode (C).
The motor rotates CW and the received data is printed until the FAX reception is completed.
The motor rotates CW and the recording paper is ejected.
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
END

Note:

See “Sensor Locations” in 6.5. SENSORS AND SWITCHES().

6.4.6.3.4. COPYING


(a) Document detection
When the document is set in the paper tray, does the DOCUMENT SENSOR (PS301) turn ON?
NO
See 2.3.10. SENSOR BOARD SECTION.
YES
(b) Pre-feeding documents
The motor rotates CW and the Separation Roller pre-feeds the document.
Press the start key.
The motor rotates CW and does the READ POSTITION SENSOR (PS302) turn ON?
NO
See 2.3.10. SENSOR BOARD SECTION.
YES
The motor rotates CCW and CAM Gear is set to the Paper-Pickup mode (B).
The motor rotates CW and the recording paper is picked up and fed until the PAPER TOP SENSOR (PS502) turns OFF.
The motor rotates CCW and CAM Gear is set to the Copy mode (D).
(c) Feeding recording paper
Feeding document paper
The motor rotates CW and the Platen Roller feeds recording paper. Document Feed Roller feeds document.
(d) Copying
The motor rotates CW and the document data is scanned by the IMAGE SENSOR (CIS). Then, the recording paper is printed until the READ POSITION SENSOR (PS302) turns OFF.
The motor rotates CCW and CAM Gear is set to the Receive mode (C).
(e) Ejecting recording paper
The motor rotates CW and the recording paper is ejected.
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
(f) Ejecting documents
The motor roates CW and the document is ejected.
END

Note:

See “Sensor Locations” in 6.5. SENSORS AND SWITCHES().

CROSS REFERENCE:

2.3.10. SENSOR SECTION()

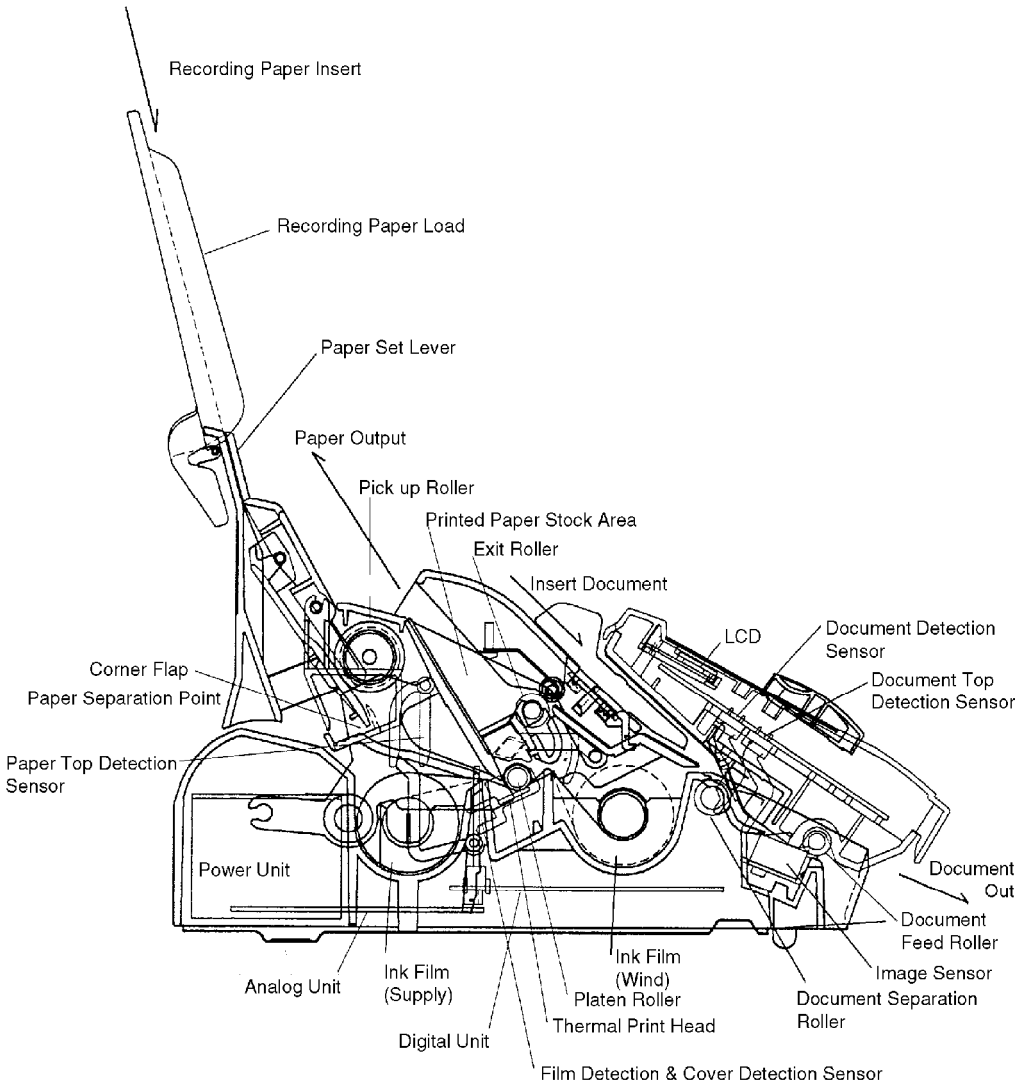
6.5. SENSORS AND SWITCHES

All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Message Error
Operation Panel	SW352	Document set SW	[CHECK DOCUMENT]
	SW353	Document top SW	[REMOVE DOCUMENT]
Digital PCB	SW501	Film End/Cover open	[CHECK COVER] or [CHECK FILM]
	PS501	Paper Top	[PAPER JAMMED]
Analog P.C.B	SW102	Motor Position	————
	SW101	Hook	————

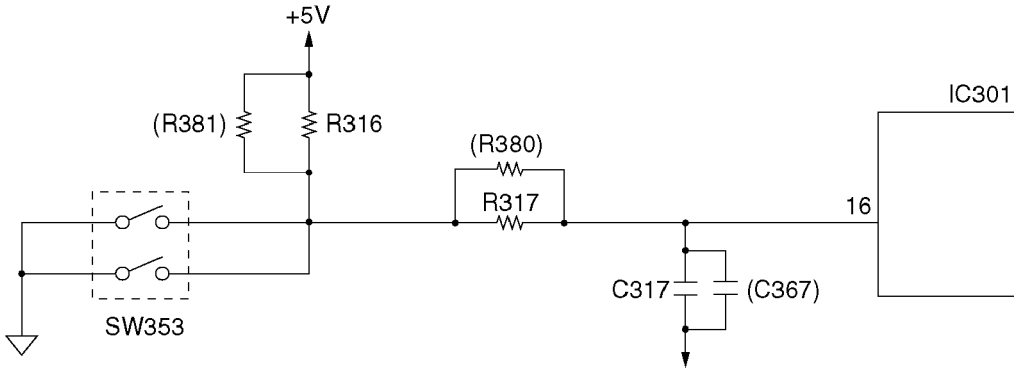
Note:
See 2.5. TEST FUNCTIONS(). (#815: Sensor Check)

Sensor Locations



1. [Document top SW (SW353)]

When a document is brought to the read position, the SW becomes ON, and the input signal of IC301-16 pin (Operation) becomes a low level. When there is no document at the read position, the SW becomes OFF, and the input signal of IC301-16 pin (Operation) becomes a high level.

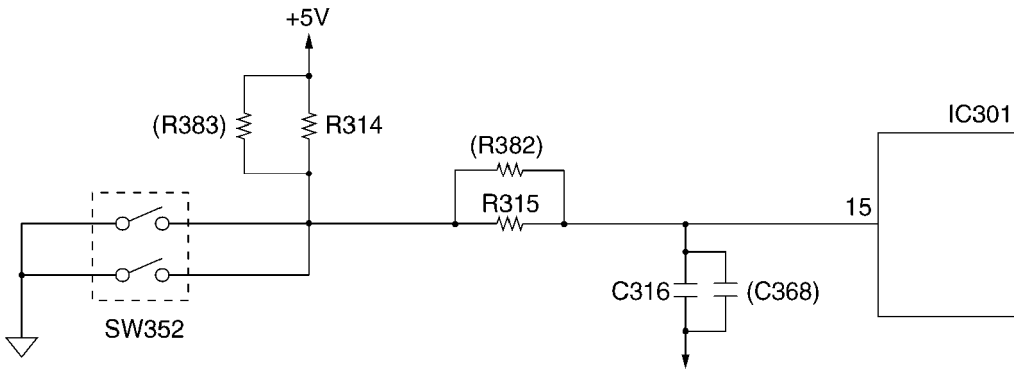


Operation Board

	Photo transistor	Signal (IC301-16 pin)
Out of the Read Position	OFF	High level
At the Read Position	ON	Low level

2. [Document Set (SW352)]

When a document is set, the SW becomes ON, and the input signal of IC301-15 pin (Operation) becomes a low level. When there is no document, the SW becomes ON, and the input signal of IC301-15 pin (Operation) becomes a high level.

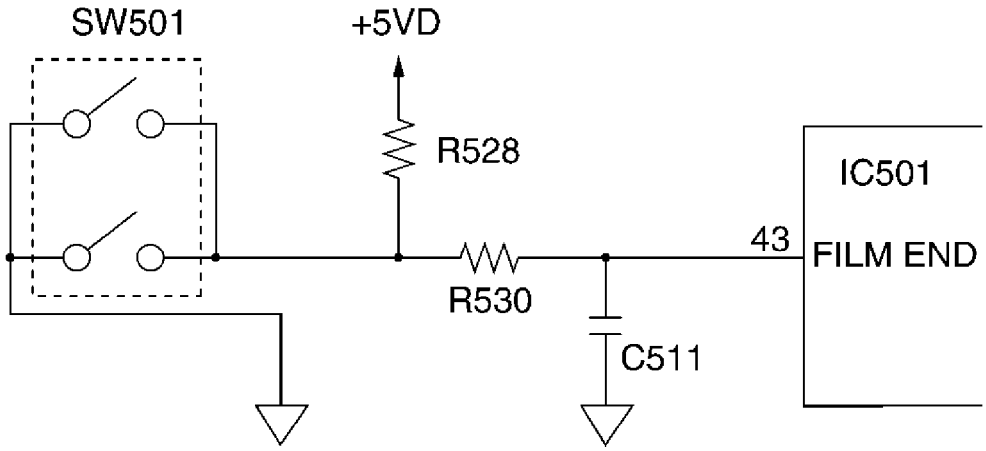


Operation Board

	Photo transistor	Signal (IC301-15 pin)
No document	OFF	High level
Set document	ON	Low level

3. [Cover Open/Film End SW (SW501)]

When the operation panel cover is closed and a film is set, the SW becomes ON, and the input signal of IC501-43 pin (Digital) becomes a low level. When the cover is opened, the SW becomes OFF, and the input signal of IC501-43 pin (Digital) becomes a high level.



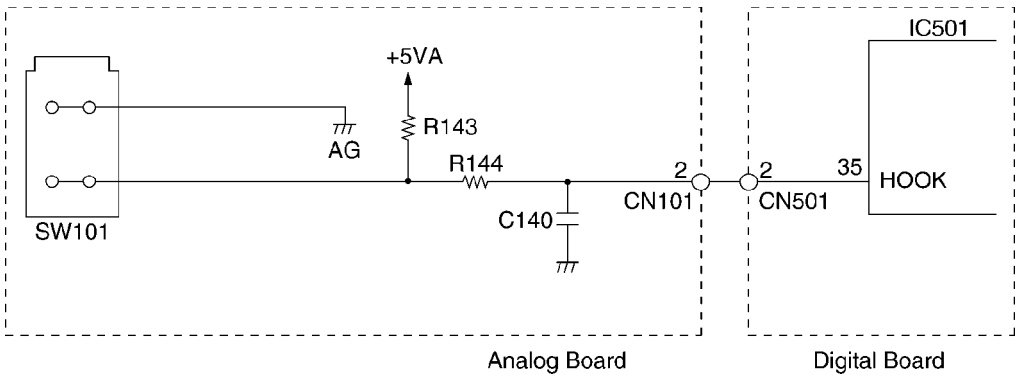
Digital Board

	Photo transistor	Signal (IC501-43 pin)
Cover open or no film	OFF	High level
Cover closed and set a film	ON	Low level

4. [Hook Switch (SW101)]

When the handset is lifted, the switch turns ON, and the signal at pin 35 of IC501 becomes low.

When the handset is returned, the switch turns OFF, and the signal at pin 35 of IC501 becomes high.



Digital Board

	SW	Signal (IC501-35 pin)
ON-Hook	OFF	High level
OFF-Hook	ON	Low level

5. [Paper top Sensor (PS501)]

When the recording paper is loaded on the print head, the shelter plate shuts the sensor light, and the photo transistor becomes OFF. The input signal of IC501-44 pin becomes a high level. Usually, the shelter plate is lifted, the photo transistor becomes ON, and the input signal of IC501-44 pin becomes a low level.

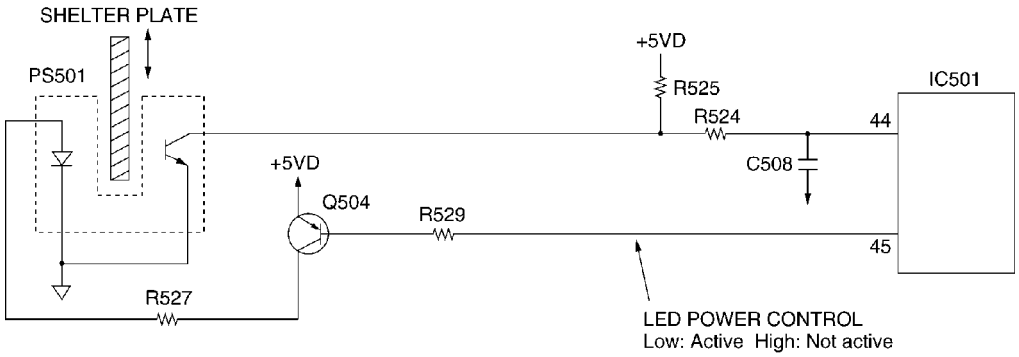
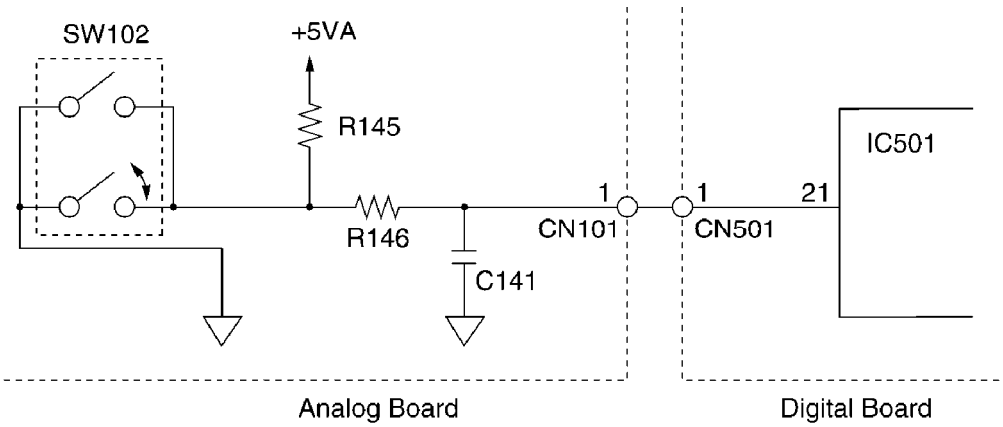


	Photo transistor	Signal (IC501-44 pin)
Set recording paper	OFF	High level
No recording paper	ON	Low level

6. [Motor Position Sensor (SW102)]

This sensor is a detection switch for recording the position of the CAM.



	Signal (IC501-21 pin)
Home position	Low level
Other	High level

6.6. MODEM SECTION

6.6.1. FUNCTION

The unit uses a 1 chip modem (IC505) that serves as an interface between the control section for FAX transmission and reception and the telephone line. During a transmitting operation, the digital image signals are modulated and sent to the telephone line.
During a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by ITU-T. This 1 chip modem (IC505) has hardware which sends and detects all of the necessary signals for FAX communication.
It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505).
This modem (IC505) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.
Overview of Facsimile Communication Procedures (ITU-T Recommendation):

1. ON CCITT (International Telegraph and Telephone Consultative Committee)

The No. XIV Group of ITU-T, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

2. Definition of Each Group

- Group I (G1)
Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines. Determined in 1968.
Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.

- Group II (G2)
Using reduction technology in the modulation/demodulation format, an A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.
Methods to suppress redundancy are not used.
Determined in 1976.

- Group III (G3)
Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.
Determined in 1980.

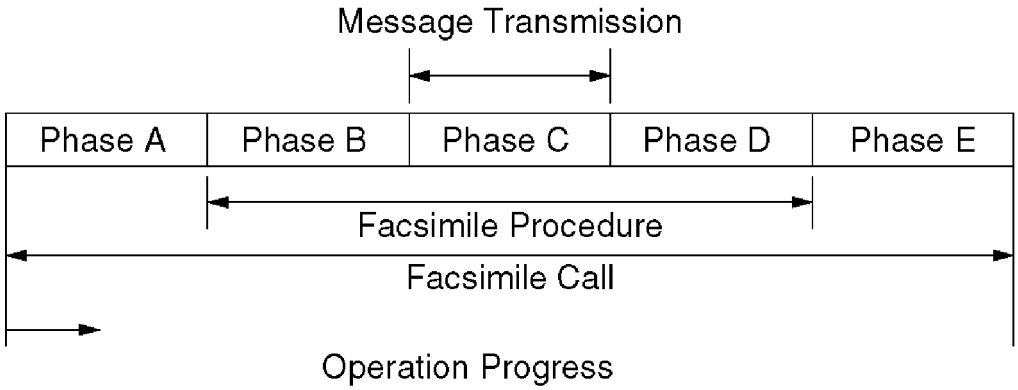
- Group IV (G4)
Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and

error-free reception of transmission is possible.

The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3. Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A : Call setting

Call setting can be manual/automatic.

Phase B : Pre-message procedure

Phase B is a pre-processing procedure and sequence for confirming the status of the terminal, transmission route, etc., and for terminal control. It implements terminal preparation status, determines and displays terminal constants, confirms synchronization status, etc. and prepares for transmission of facsimile messages.

Phase C : Message transmission

Phase C is the procedure for the transmitting facsimile messages.

Phase D : Post message procedure

Phase D is the procedure for confirming that the message is completed and received. For continuous transmission, phase B or phase C is repeated for transmission.

Phase E : Call retrieval

Phase E is the procedure for call retrieval, that is for circuit disconnection.

4. Concerning Transmission Time

[Transmission Time] = [Control Time] + [Image Transmission Time] + [Hold Time]

Transmission time consists of the following.

Control time:
This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:
This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

Hold time:
This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/or the existence of continuous transmission.

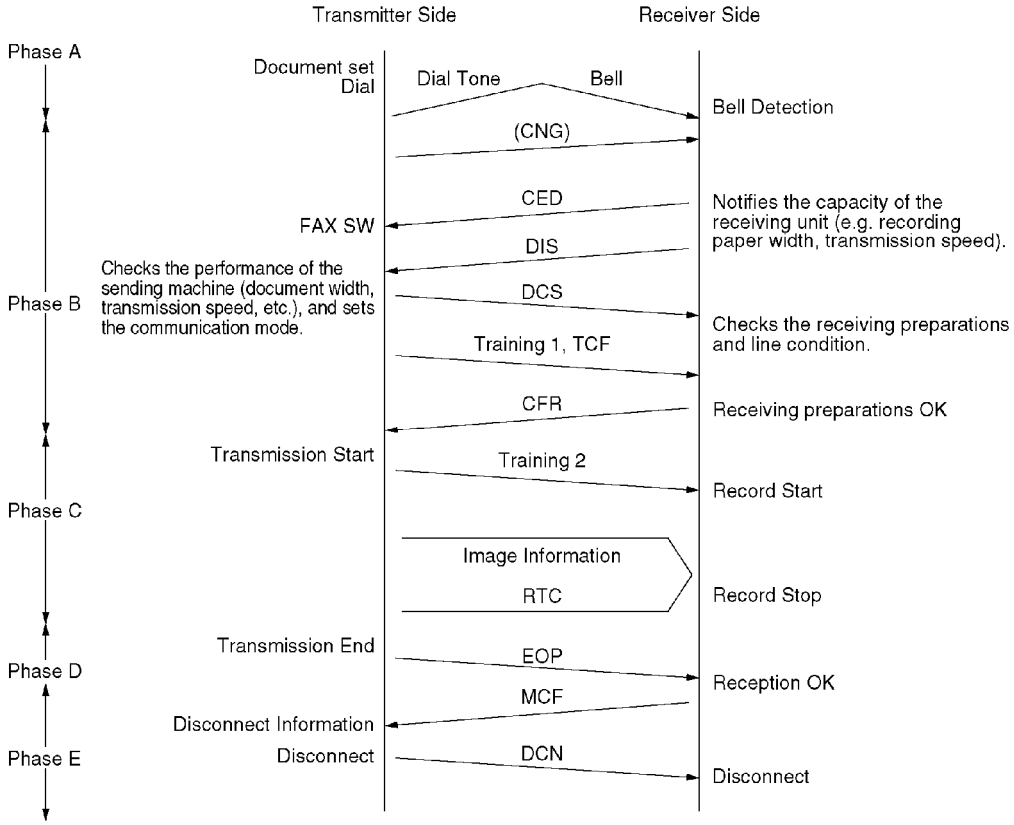
5. Facsimile Standards

Item	Telephone Network Facsimile G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (Control Signal) 2400, 4800, 7200, 9600 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension : MH Mode 2 dimension : MR Mode (K=2.4)
Resolution	Main Scan : 8 pel/mm Sub Scan : 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on the degree of data reduction. Minimum Value : 10, 20 Can be recognized in 40ms.

6. Explanation of Communication and Compression Technology

A. G3 Communication Signals (T. 30 Binary Process)

For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals. Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1. / An example of a binary process in G3 communication is shown below.



Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal) / Identification Signal

Format.....00000001

Function: / Notifies the capacity of the receiving unit. The added data signals are as follows.

Signal.....DCS (Digital Command Signal) / Identification Signal

Format.....X1000001

Example (Some models do not support the following items.):

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	Reserved for future T.3 operation features	
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11, 12, 13, 14	Data signaling rate	Data signaling rate
0, 0, 0, 0	V.27 ter fall back mode	2400 bit/s, V.27 ter
0, 1, 0, 0	V.27 ter	4800 bit/s, V.27 ter
1, 0, 0, 0	V.29	9600 bit/s, V.29
1, 1, 0, 0	V.27 ter and V.29	7200 bit/s, V.29
0, 0, 1, 0	Not used	14400 bit/s, V.33
0, 1, 1, 0	Reserved	12000 bit/s, V.33
1, 0, 1, 0	Not used	Reserved
1, 1, 1, 0	V.27 ter and V.29 and V.33	Reserved
0, 0, 0, 1	Not used	14400 bit/s, V.17
0, 1, 0, 1	Reserved	12000 bit/s, V.17
1, 0, 0, 1	Not used	9600 bit/s, V.17
1, 1, 0, 1	V.27 ter and V.29 and V.33 and V.17	7200 bit/s, V.17
0, 0, 1, 1	Not used	Reserved
0, 1, 1, 1	Reserved	Reserved
1, 0, 1, 1	Not used	Reserved
1, 1, 1, 1	Reserved	Reserved
15	R8×7.7 lines/mm and/or 200×200 pels/ 25.4mm	R8×7.7 lines/mm and/or 200×200 p 25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capabilit

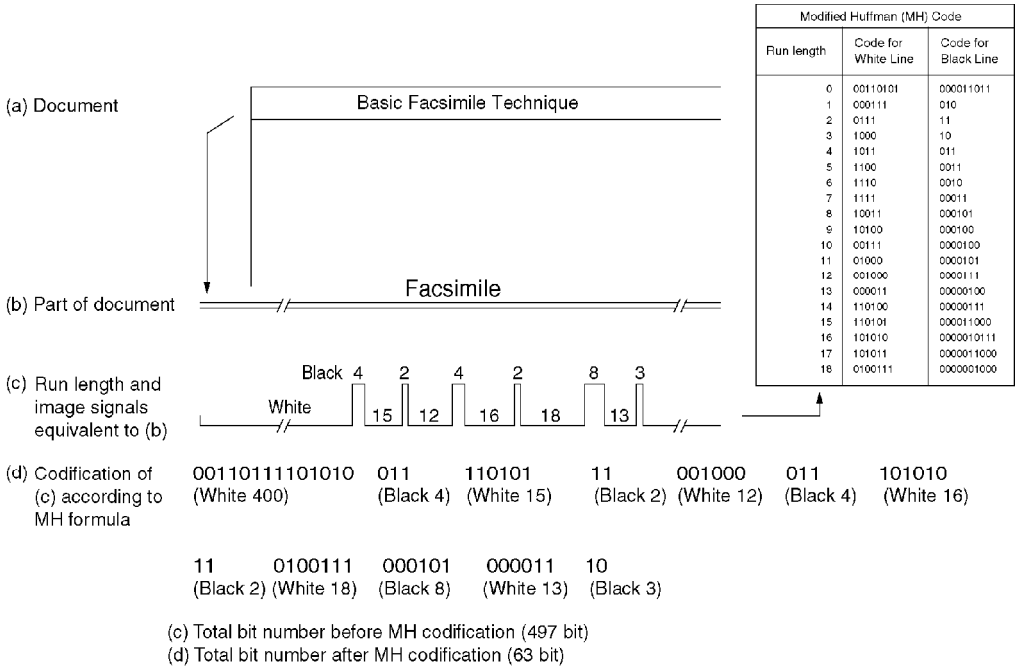
Bit No.	DIS/DTC	DCS
17, 18	Recording width capabilities	Recording width
(0, 0)	1728 picture elements along scan line length of 215 mm ± 1%	1728 picture elements along scan l length of 215 mm ± 1%
(0, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1%	2432 picture elements along scan l length of 303 mm ± 1%
(1, 0)	2432 picture elements along scan line length of 303 mm ± 1%	2048 picture elements along scan l length of 255 mm ± 1%
(1, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% Invalid	Invalid
19, 20	Maximum recording length capability	Maximum recording length
(0, 0)	A4 (297 mm)	A4 (297 mm)
(0, 1)	Unlimited	Unlimited
(1, 0)	A4 (297 mm) and B4 (364 mm)	B4 (364 mm)
(1, 1)	Invalid	Invalid
21, 22, 23	Minimum scan line time capability of the receiver	Minimum scan line time
(0, 0, 0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	20 ms
(0, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	40 ms
(0, 1, 0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	10 ms
(1, 0, 0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	5 ms
(0, 1, 1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to "0".	Frame size 0 = 256 octets 1 = 64 oc
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PST
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field

Bit No.	DIS/DTC	DCS
33 (0) (1)	Validity of bits 17, 18 Bits 17, 18 are valid Bits 17, 18 are invalid	Recording width Recording width indicated by bits Recording width indicated by this information
34	Recording width capability 1216 picture elements along scan line length of 151 ± mm 1%	Middle 1216 elements of 1728 pictu elements
35	Recording width capability 864 picture elements along scan line length of 107 ± mm 1%	Middle 864 elements of 1728 pictur elements
36	Recording width capability 1728 picture elements along scan line length of 151 ± mm 1%	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 ± mm 1%	Invalid
38	Reserved for future recording width capability.	
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8×15.4 lines/mm	R8×15.4 lines/mm
42	300×300 pels/25.4 mm	300×300 pels/25.4 mm
43	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm	R16×15.4 lines/mm and/or 400×400 25.4 mm
44	Inch based resolution preferred	Resolution type selection "0" : neuritic based resolution "1" : inch based resolution
45	Metric based resolution preferred	Don’t care
46	Minimum scan line time capability for higher resolutions "0" : $T_{15.4} = T_{7.7}$ "1" : $T_{15.4} = 1/2T_{7.7}$	Don’t care
47	Selective Polling capability	Set to "0".
48	Extend field	Extend field

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.
Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.
Note 3 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————————	A fixed pattern is transmitted to the receiving at a speed (2400 to 9600 bps) designated by D and the receiving side optimizes the automati equalizer, etc., according to this signal.
TCF (Training Check)	————————	Sends 0 continuously for 1.5 seconds at the s speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies the sending side that TCF has been properly received. If TCF is not properly recei FTT (Failure To Train) X0100010 is relayed to sender. The sender then reduces the transmi speed by one stage and initiates training onc again.
Training 2	————————	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	————————
RTC (Return to Control)	————————	Sends 12 bits (0...01 × 6 times) to the receiver the same speed as the image signal and notif completion of transmission of the first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there still more documents to be sent, they are outp instead of EOP. After MCF reception, the send transmits an image signal of the second shee
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it i output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	This is output when an operator call is receiv

B. Redundancy Compression Process Coding Mode / This unit uses one-dimensional MH format.


(a) Document
Basic Facsimile Technique
(b) Part of document
Facsimile
(c) Run length and image signals equivalent to (b)
Black 4 2 4 2 8 3
White 15 12 16 18 13
(d) Codification of (c) according to MH formula
00110111101010 (White 400)
011 (Black 4)
110101 (White 15)
11 (Black 2)
001000 (White 12)
011 (Black 4)
101010 (White 16)
11 (Black 2)
0100111 (White 18)
000101 (Black 8)
000011 (White 13)
10 (Black 3)
(c) Total bit number before MH codification (497 bit)
(d) Total bit number after MH codification (63 bit)

Modified Huffman (MH) Code

Run length	Code for White Line	Code for Black Line
0	00110101	0000110111
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

6.6.2. MODEM CIRCUIT OPERATION

The modem (IC505) has all the hardware satisfying the ITU-T standards mentioned previously. When the ASIC IC501 (61) is brought to a low level, the modem (IC505) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC501) ADR0-ADR4(pin 83~87). Commands are written through the data bus, and all processing is controlled by the ASIC (IC501) according to ITU-T procedures. Here, the INT signal dispatched from IRQ (pin 60 of IC505) to the ASIC (IC501) implements post processing.
This modem (IC505) has an automatic application equalizer. With training signal 1 or 2 at the time of G3 reception, it can automatically establish the optimum equalizer. The modem (IC505) clock is supplied by pin 55 of ASIC (IC501).

1. Facsimile Transmission/DTMF Line Send

The digital image data on the data bus is modulated in the modem (IC505), and sent from pin 44 via amplifier IC501(2 → 1), Analog SW IC509(1 → 2), amplifier IC511(2 → 1) and the NCU section to the telephone line.
Refer to 2.3.7.1. CHECK SHEET().

2. Facsimile Reception

The analog image data which is received from the telephone line passes through the NCU section and enters pin 45 of the modem (IC505). The signals that enter pin 45 of the modem (IC505) are demodulated in the board to digital image signals, then placed on the data bus.
In this case, the image signals from the telephone line are transmitted serially. Hence, they are placed on the bus in 8 bit

units. Here, the internal equalizer circuit reduces the image signals to a long-distance receiving level.
This is designed to correct the characteristics of the frequency band centered around 3 kHz and maintain a constant receiving sensitivity.
It can be set in the service mode.
Refer to 2.3.7.1. CHECK SHEET().

3. **DTMF Transmission (Monitor tone)**
   The DTMF signal generated in the modem (IC505) is output from pin 44, and the NCU section to the telephone line the same as facsimile transmission signals.
   (DTMF Monitor Tone)
   Refer to 2.3.7.1. CHECK SHEET().

4. **Busy/Dial Tone Detection**
   The path is the same as FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC505) becomes 1, and this status is monitored by ASIC (IC501).

6.7. DESCRIPTION OF BLOCK DIAGRAM IN ANALOG SECTION

1. **Function**
   The analog section serves as an interface between the telephone line. The digital board (IC505) for transmission and reception of FAX signals, switches between the digital board (IC505) and other sections by means of a multiplexer in the NCU section. The control signals to the individual analog sections are output mainly from ASIC IC501, and the status information for the various sections is also held in ASIC IC501. / Simple explanations for the various sections are given below.

2. **Circuit Operation**

[NCU Section]
This is the interface between the telephone line and external telephone. This is composed of a bell detection circuit, pulse dial generation circuit, EXT. TAM OFF-HOOK detect circuit, vox circuit, amplifier circuit for line transmission and reception, sidetone circuit, etc. /

[Modem (IC505)]
This is used for FAX signal tone modulation, DTMF signal transmission, ring tone generation, and

line transmission beep generation. The DTMF signal and beep are placed into the TX system. The ring tone passes through the analog switch and is output to the speaker via the power amplifier (IC102).

6.7.1. ANALOG UNIT BLOCK DIAGRAM

6.8. NCU SECTION

6.8.1. GENERAL

This section is the interface between the telephone line and external telephone. It is composed of an EXT. TEL line relay (RL101), bell detection circuit, pulse dial circuit, TAM interface circuit, line amplifier and sidetone circuits and a multiplexer.

6.8.2. EXT. TEL. LINE RELAY (RL101)

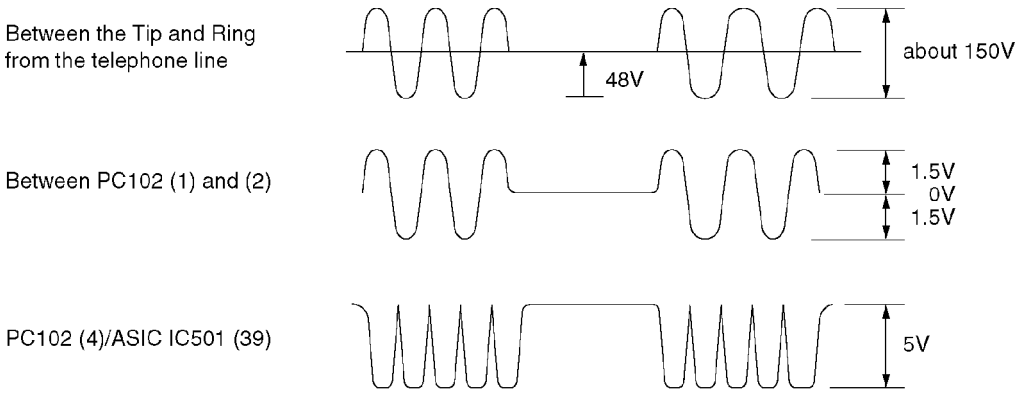
1. Circuit Operation

Normally, this relay switches to the external telephone side (break) and switches to the open side (make) while OFF-HOOK.
{ IC501 (38) High Level → CN501 (5) High Level } → CN101 (5) High Level → Q103 ON → RL101 (make)

6.8.3. BELL DETECTION CIRCUIT

1. Circuit Operation

The signal waveform for each point is indicated below. The signal (low level section) input to pin 39 of ASIC IC501 on the digital board is read by ASIC and judged as a bell.
TEL LINE → PC102 (1, 2 - 4) → IC501 (39)



6.8.4. TAM INTERFACE CIRCUIT

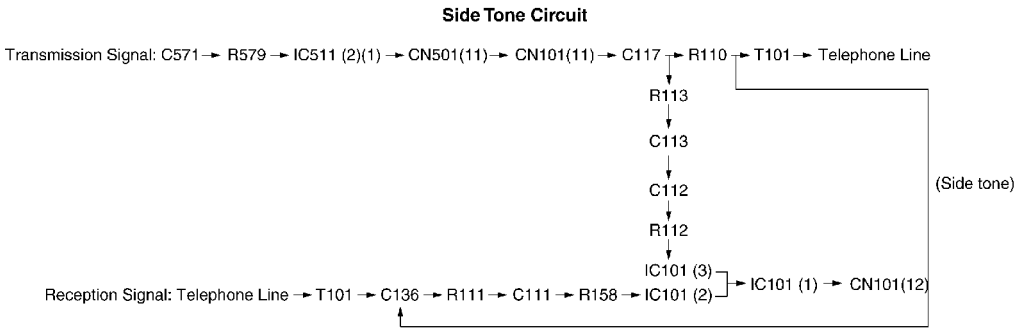
This circuit is to switch between FAX receiving and the external TAM's message recording automatically. This circuit consists of an EXT. TAM OFF-HOOK detect circuit, monitor transformer, multiplexer, amplifier, and VOX detect circuit.
For details, please refer to 6.10. TAM INTERFACE SECTION().

6.8.5. LINE AMPLIFIER AND SIDE TONE CIRCUIT

1. Circuit Operation

The reception signal output from the line transformer T101 is input to pin (2) of IC101 via C136, R111, C111 and R158 and then the signal is amplified at pin (1) of IC101 and sent to the reception system at 11.6dB.

The transmission signal goes through C571 and R579 and enters IC511-pin (2), where the signal is amplified to about 7.4dB. Then, it is output from pin (1) of IC101 and transmitted to T101 via C117 and R110. If the side tone circuit is not applied, the transmission signal will return to the reception amplifier via C136, R111, C111 and R158. When the side tone circuit is active, the signal output from IC101 pin (1) passes through C117, R113, C113, C112 and R112 and goes into the amplifier IC101 pin (3). This circuit is used to cancel the transmission return signal.



6.9. ITS (Integrated Telephone System) AND MONITOR SECTION

6.9.1. GENERAL

During the monitor operation, the speaker output passes through the power amplifier (IC102) [Analog board]. / The DTMF signal is output from the modem (IC505: digital board). The alarm tone, the key tone, bell tone, and beep are output from gate array IC501 (digital board). During a pulse dial operation, the monitor tone is output from gate array IC501.

6.9.2. TELEPHONE MONITOR

1. Function

This is the function when you are not holding the handset and can hear the caller's voice from the line.

2. Signal path

Refer to 2.3.7.1. CHECK SHEET().

6.9.3. HANDSET CIRCUIT

1. Function

This circuit controls the conversation over the handset, i.e. the transmitted and received voices to and from the handset.

2. Signal path (Transmission signal)
   Refer to 2.3.7.1. CHECK SHEET().

3. Signal path (Reception signal)
   Refer to 2.3.7.1. CHECK SHEET().

6.9.4. MONITOR CIRCUIT

1. Function
   This circuit monitors various tones, such as 1 DTMF tone,2 Alarm/ Beep/Key tone/Bell 3 Dummy ring back tone.

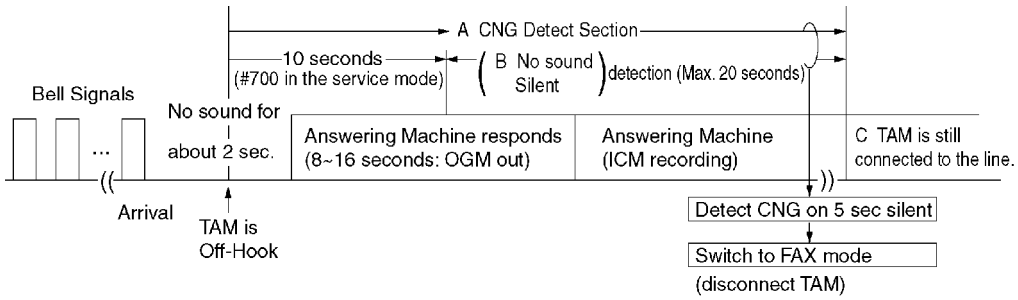
2. Signal path
   A. DTMF MONITOR
      (Speaker Operation)
      Refer to 2.3.7.1. CHECK SHEET().
      (Handset Operation)
      Refer to 2.3.7.1. CHECK SHEET().
   B. ALARM/BEEP/KEY TONE/BELL
      Refer to 2.3.7.1. CHECK SHEET().
   C. DUMMY RING BACK TONE
      Refer to 2.3.7.1. CHECK SHEET().

6.10. TAM INTERFACE SECTION

6.10.1. FUNCTION

If EXT. TAM is selected in the Receive mode, the unit receives documents for FAX calls or the external TAM records a voice message automatically.
To switch between the answering machine and facsimile in the EXT. TAM Mode.

#	EXTERNAL TAM OPERATION	UNIT OPERATION
1	When the bell signal rings as many times as the number memorized into the connected answering machine (TAM), the answering machine is connected to the line and the answering message is sent out to the line. (OGM out for 8 ~ 16 sec.)	The length of the answering message should be 8~16 seconds. While the message is being played, the unit starts to detect the CNG signal.(A) If the unit detects the CNG signal, it will switch to FAX receiving and disconnect the external TAM automatically.
2	After sending the OGM, the answering machine starts to record the message of the other party (ICM recording).	After the OGM of the external TAM is finished, the unit starts to detect approximately 5 seconds of no sound detection. (B) If no sound is detected, the unit will switch to FAX receiving and disconnect the external TAM automatically. If the unit cannot detect the CNG signal or no sound for about 30 seconds, the unit will disconnect the line. (C)



Attention 1:
No sound detection lasts 20 seconds after the telephone call is received at the answering machine. If there is no sound for more than 5 seconds (#701 in the service mode), it switches to the facsimile.

Attention 2:
When the answering machine cannot answer the telephone call because of disconnection or the recording tape is full, the unit picks up the call after 5 rings (#702 in the service mode). Then it switches to the facsimile.

6.10.2. CIRCUIT OPERATION

The TAM INTERFACE circuit consists of an EXT. TAM HOOK detection circuit, CNG signal from the other party's detection circuit, VOX detection circuit (to judge sound/no-sound) and RL101 (to separate EXT. TAM).

1. EXT. TAM HOOK detection circuit

A bell is received at EXT. TAM and EXT. TAM is connected to the line, making a DC LOOP. Then, PC101 detects this voltage. During

detection, PC101 (4) becomes low.
(DC LOOP)
Tip → L101 → JJ103 → L105 → Tip1 → (EXT.TAM) → Ring 1 → L104 → RL101(5, 3) → PC101(1, 2) → L102 → POS101 → Ring

2. CNG/VOX signal detection circuit
The CNG signal from the other party's FAX is detected in MODEM IC505 (digital board).
(Signal path)
Refer to 2.3.7.1. CHECK SHEET().

3. Remote receiving
This is the parallel-connected DTMF signal for the TEL or EXT.TEL mode between T and R. When the other party is a FAX, the unit switches to FAX receiving.
(Signal Path)
Detects the DTMF signal in the MODEM.

6.11. OPERATION BOARD SECTION

The unit consists of a LCD (Liquid crystal display), KEYs and LEDs (light-emitting diodes). They are controlled by the Gate Array (IC301) and ASIC (IC501: on the DIGITAL BOARD). (Fig.-a) / The key matrix table is shown below.

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6
KSL0		SW306 MENU	SW311 9	SW316 *		SW326 0	
KSL1	SW302 HELP	SW307 MUTE	SW312 5	SW317 4	SW322 6		
KSL2	SW303 VOL UP	SW308 COLLATE	SW313 2	SW318 1	SW323 RESOLUTION		SW333 3
KSL3	SW304 VOL DOWN	SW309 QUICK SCAN	SW314 COPY/START/SET	SW319 REDIAL/PAUSE	SW324 MONITOR	SW329 FLASH	SW334 STOP
KSL4	SW305 AUTO ANSWER	SW310 (Not Used)	SW315 8	SW320 7		SW330 DIRECTORY PROGRAM	SW335 #

XL

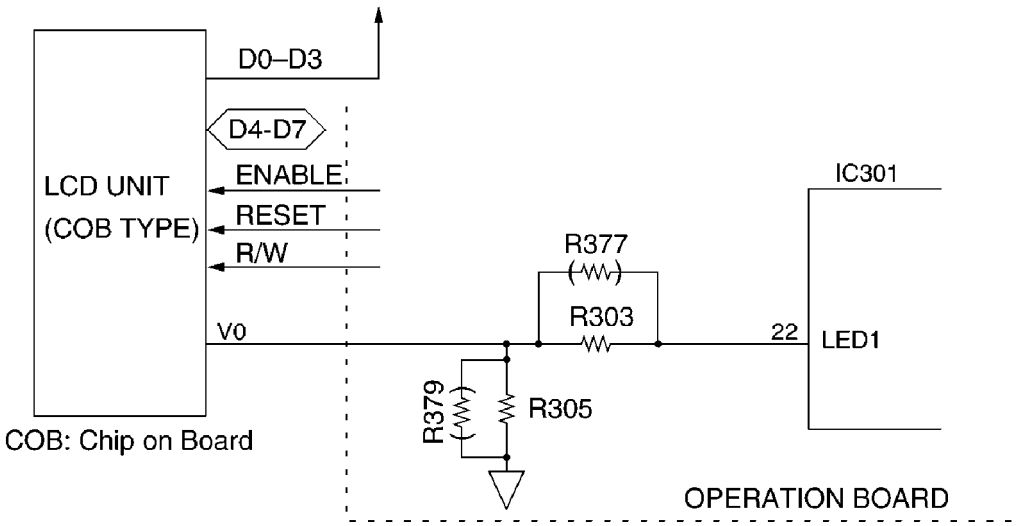
	XL12	XL11
	DOCUMENT SET	DOCUMENT TOP

6.12. LCD SECTION

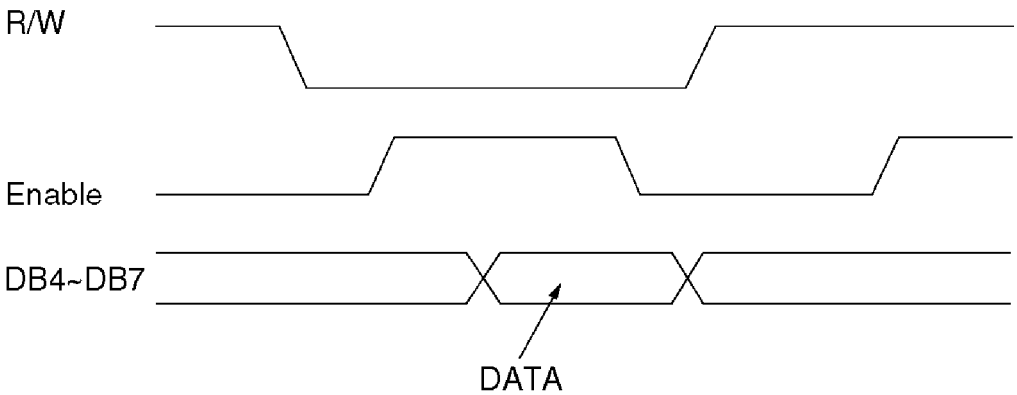
The Gate Array (IC301) works only for writing the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive.
R303(R377) and R305(R379) are density control resistors.
Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry

in the gate array (IC301).

Circuit Diagram



Timing Chart



Density	Normal	Dark
LED1 (IC301-22pin)	H	L

6.13. POWER SUPPLY BOARD SECTION

This power supply board uses the switching regulator method.

[Input Circuit]

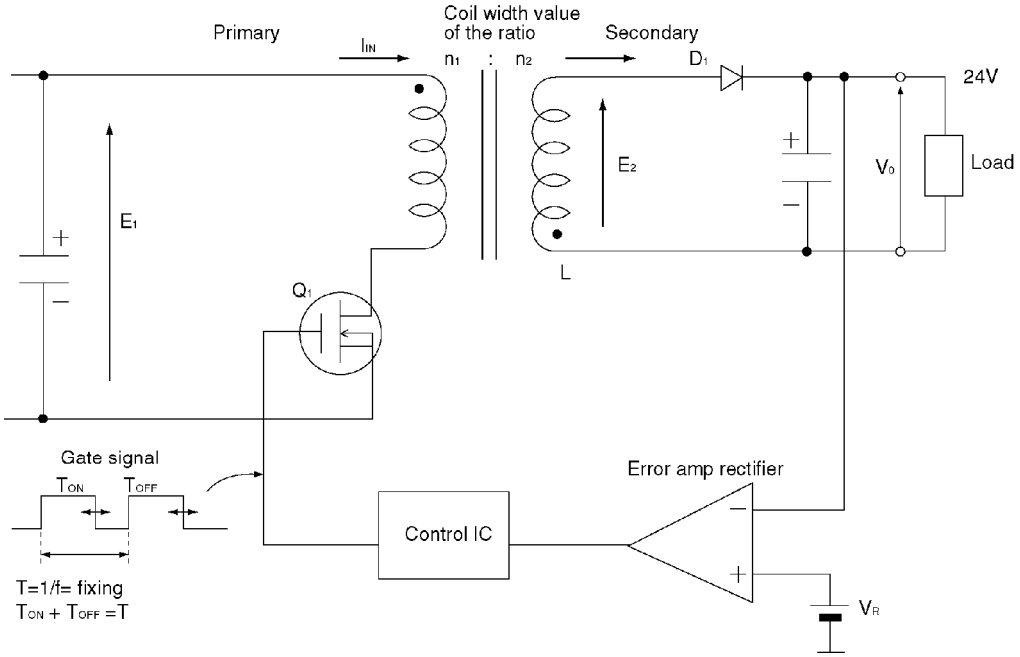
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]

The input current is rectified by D101,D102,D103 and D104 and charges C106 to make DC voltage. Then it supplies power to the converter circuit.

[Kick-on voltage circuit]

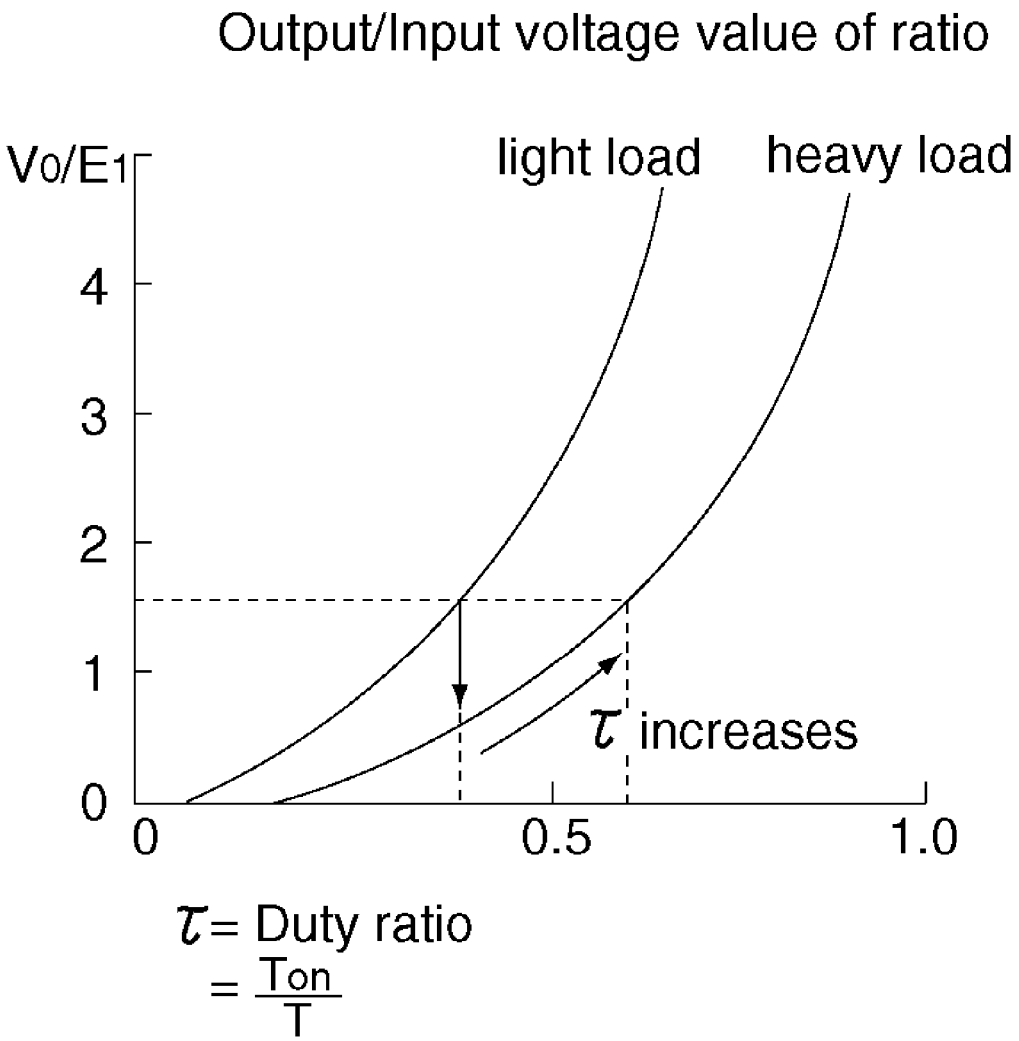
Bias is applied to the Q101 gate via this circuit when the AC power is turned on and Q101 begins operating.



The following is an overview of how the power supply unit is controlled.
The control method of this power supply unit is pulse width modulation.
When Q_1 is ON, the energy is charged in the transfer primary coil according to E_1. When Q_1 is OFF, the energy is output from the secondary transfer as follows.

L → D_1 → Load → L

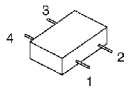
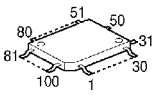
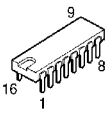
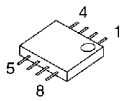
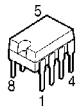
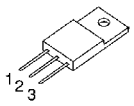
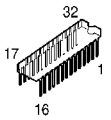
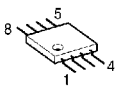
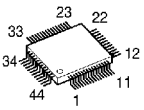
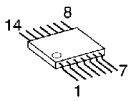
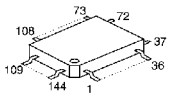
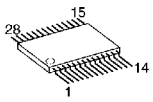
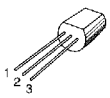
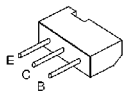
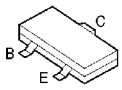
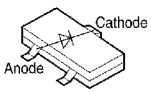
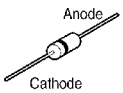
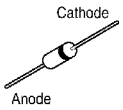
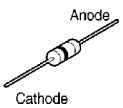
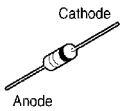
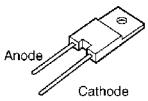
Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control IC according to the error amp rectifier. Then depending on how T_{ON} is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in τ is controlled and the output voltage is stabilized.
Therefore, basically the timing: Ton/Toff of Q1 controls the output voltage.



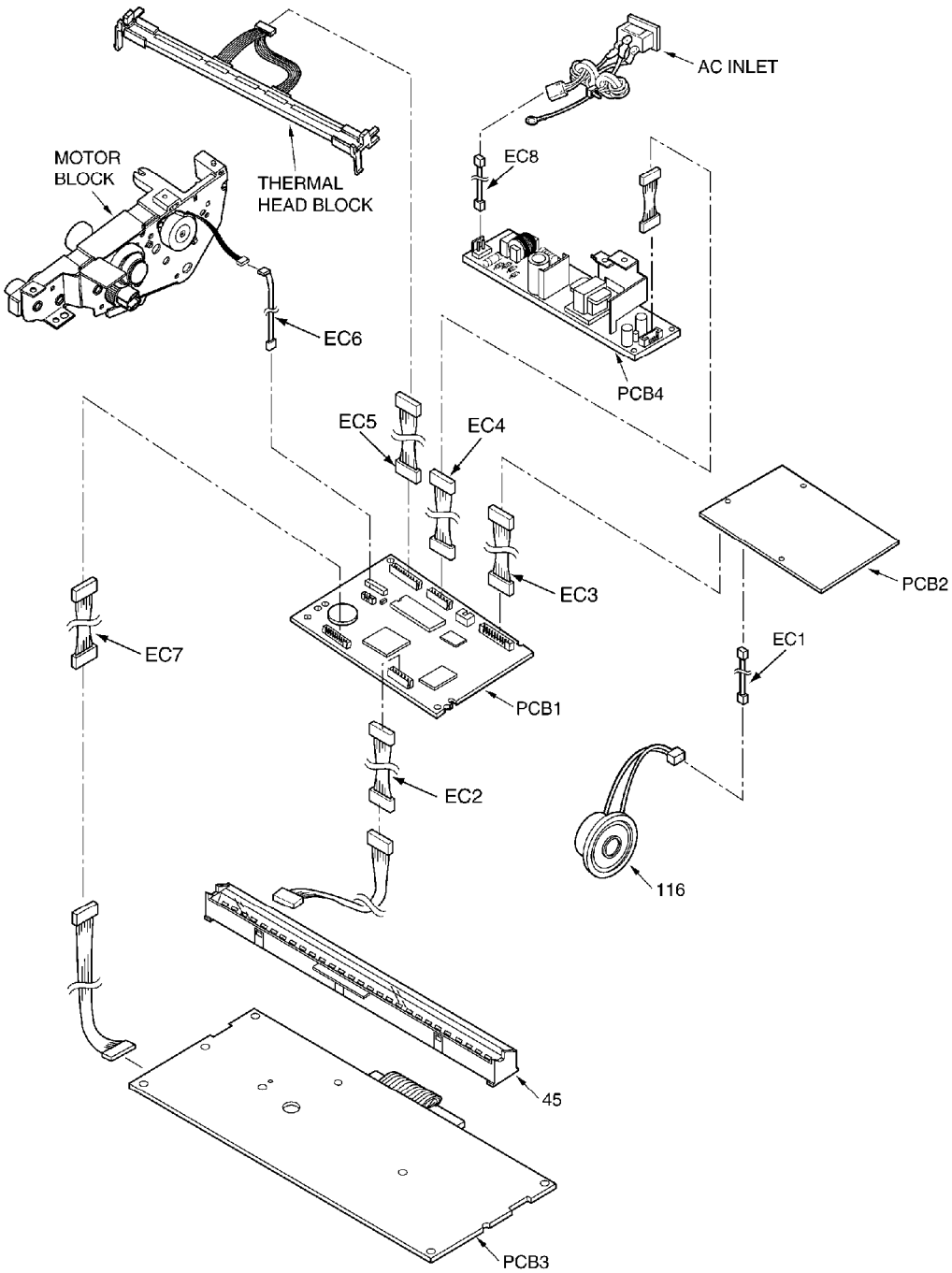
[Surge Absorber Circuit]
This circuit is for absorbing surge voltage generated by the transformer.
[Control Circuit and Detecting Circuit]
The control circuit amplifies the output with increased voltage detected in the error detecting circuit. Then it drives the main transistor.
In this power supply, the duty ratio is defined by changing the ON period of the main transistor. This is shown as follows.
When the output voltage of the 24V circuit increases, the current of the photo coupler PC101 increases, the pulse width of the output control IC becomes narrower and the ON period of Q101 becomes shorter.
[Over Current Limiter (O.C.L)]
The highest drain current (Q101) is limited by a limiter circuit (IC101) of 24V. The 24V output is limited by this circuit.
[Over Voltage Circuit]
If the 24V output increases because the error detecting circuit or control circuit is broken, IC101 will recognize this signal and output becomes 0V.
Dummy load method (to quickly check the power supply output)
Refer to 2.3.8. POWER SUPPLY BOARD SECTION().

7. TERMINAL GUIDE OF THE IC'S TRANSISTORS

AND DIODES

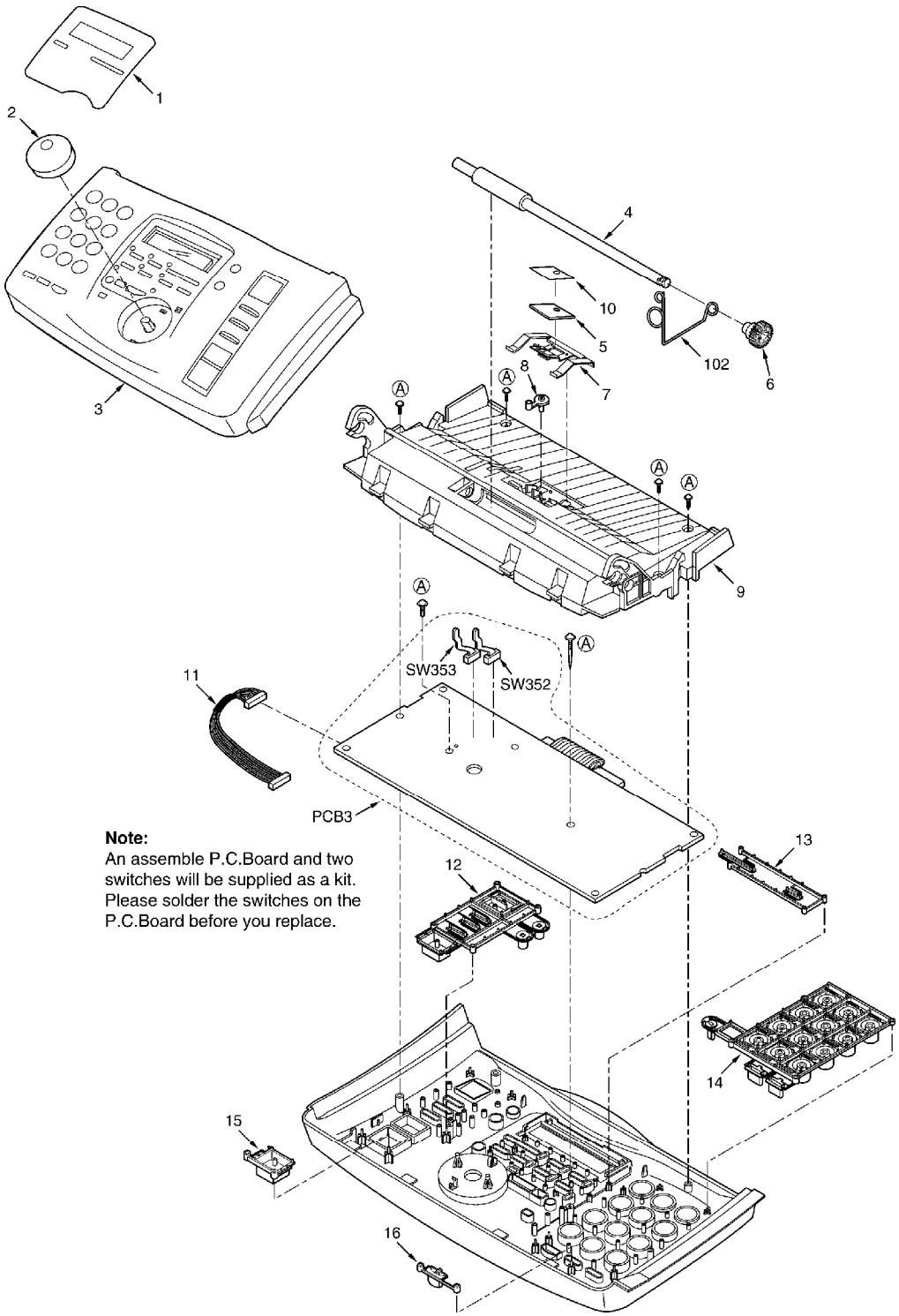
 PFVIXCN4202N	 PQVIR96DFXL	 PFVIT2003APS	 PFVTSI4431DY	 PFVIFA5317P
 PQVITA7805F	 PFWIFP80C	 PQVINJM2113M PQVINJM4558M PFVINJM2904M	 MN7D032Z9J	 PFVIMC4066BT
 PFVIM66426M1	 PFVIM0525LFF PFVIMS5148F	 AN1431T, 2SK2640	 2SB1322	 PQVTDTC143E PQVTDTC114EU 2SB709A, PQVTFB1J3P 2SC4155R, 2SC4155S
 MA141WK	 PQVDERA1802 PFVDAG01A, MA165	 1SS119	 MA7160, PFVD1N4005 MA4220, PFVDD1NL20U	 PFVDRMRLS245 MA4056
 PFVDSF5LC20U				

8. FIXTURES AND TOOLS

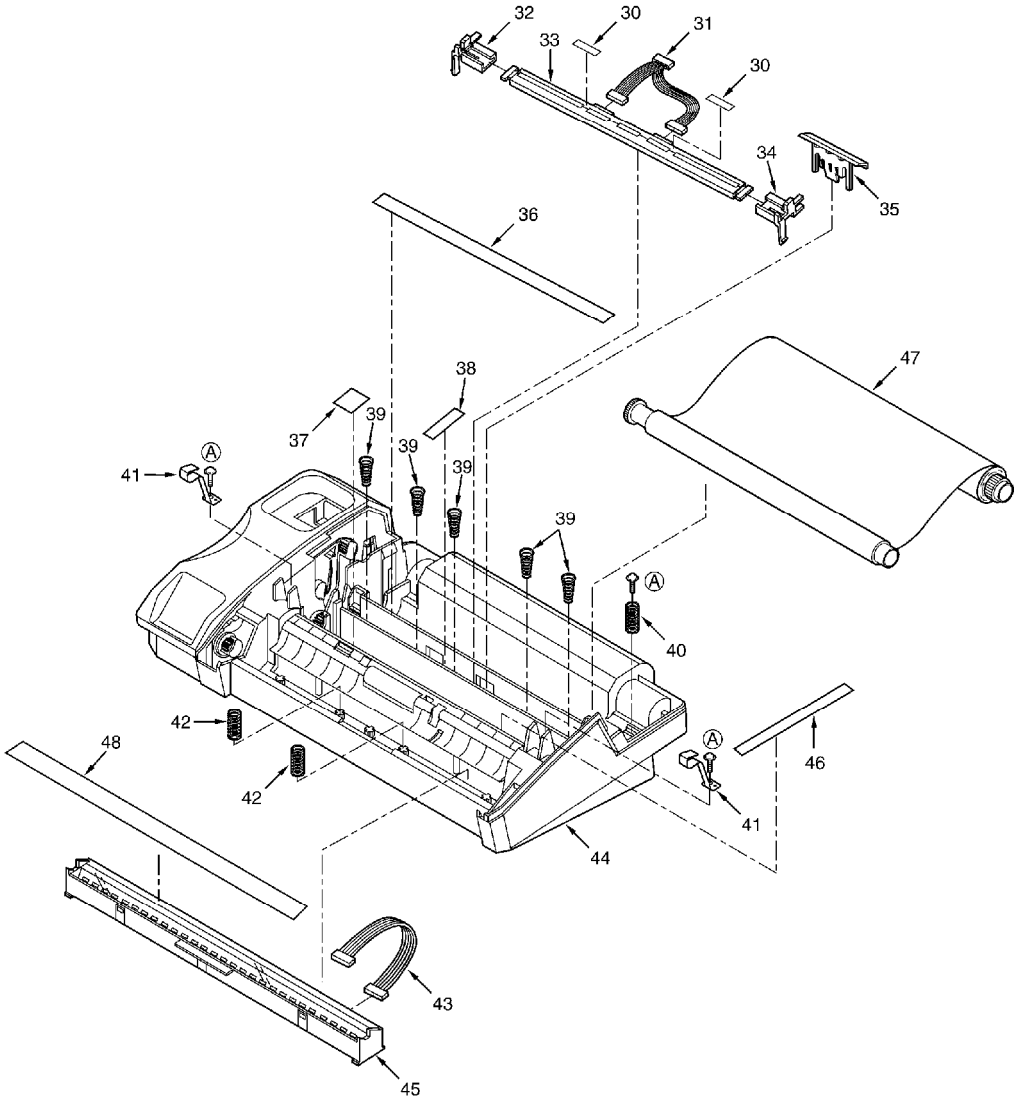


9. CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

9.1. OPERATION PANEL SECTION

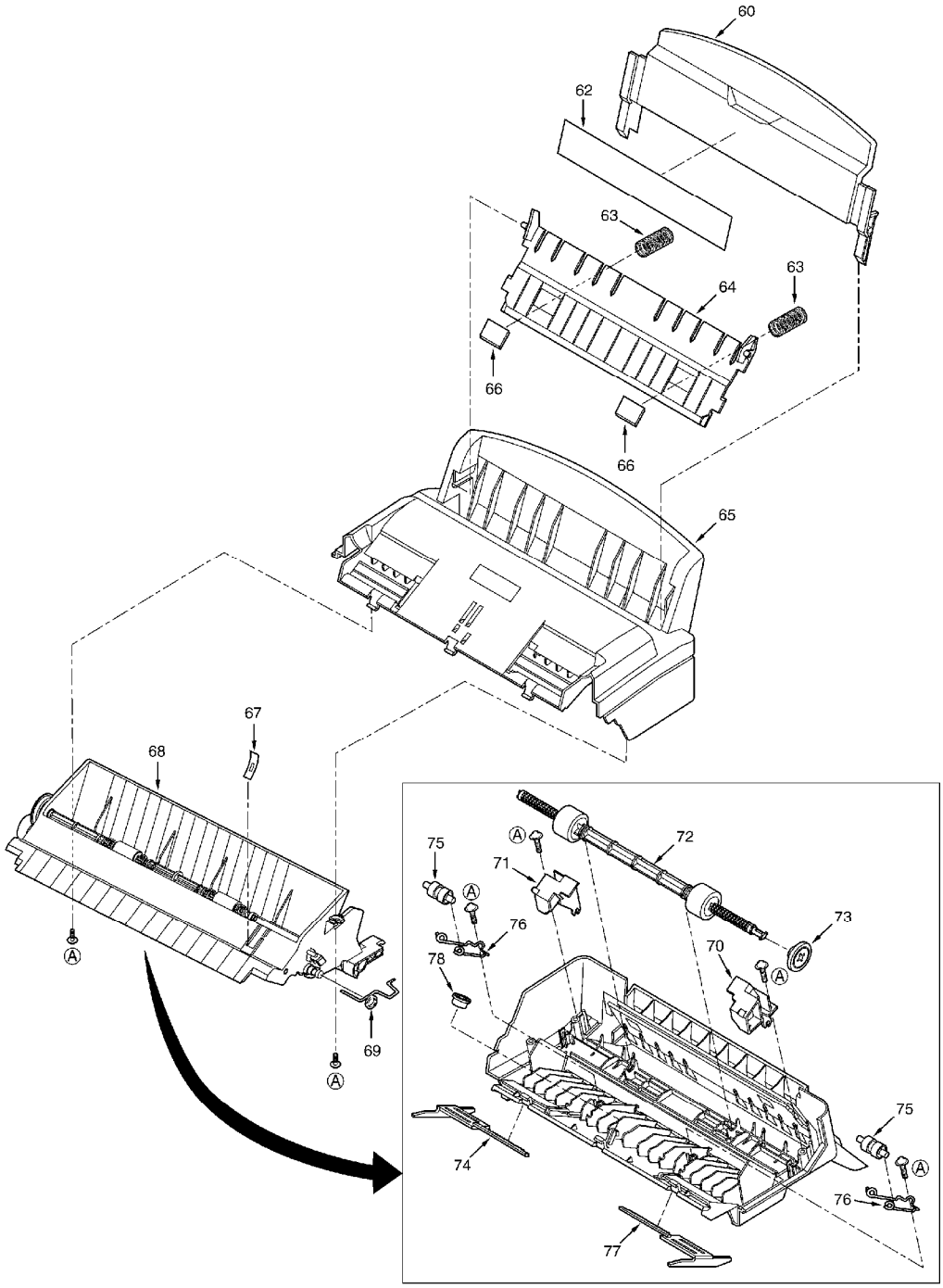


9.2. UPPER CABINET SECTION

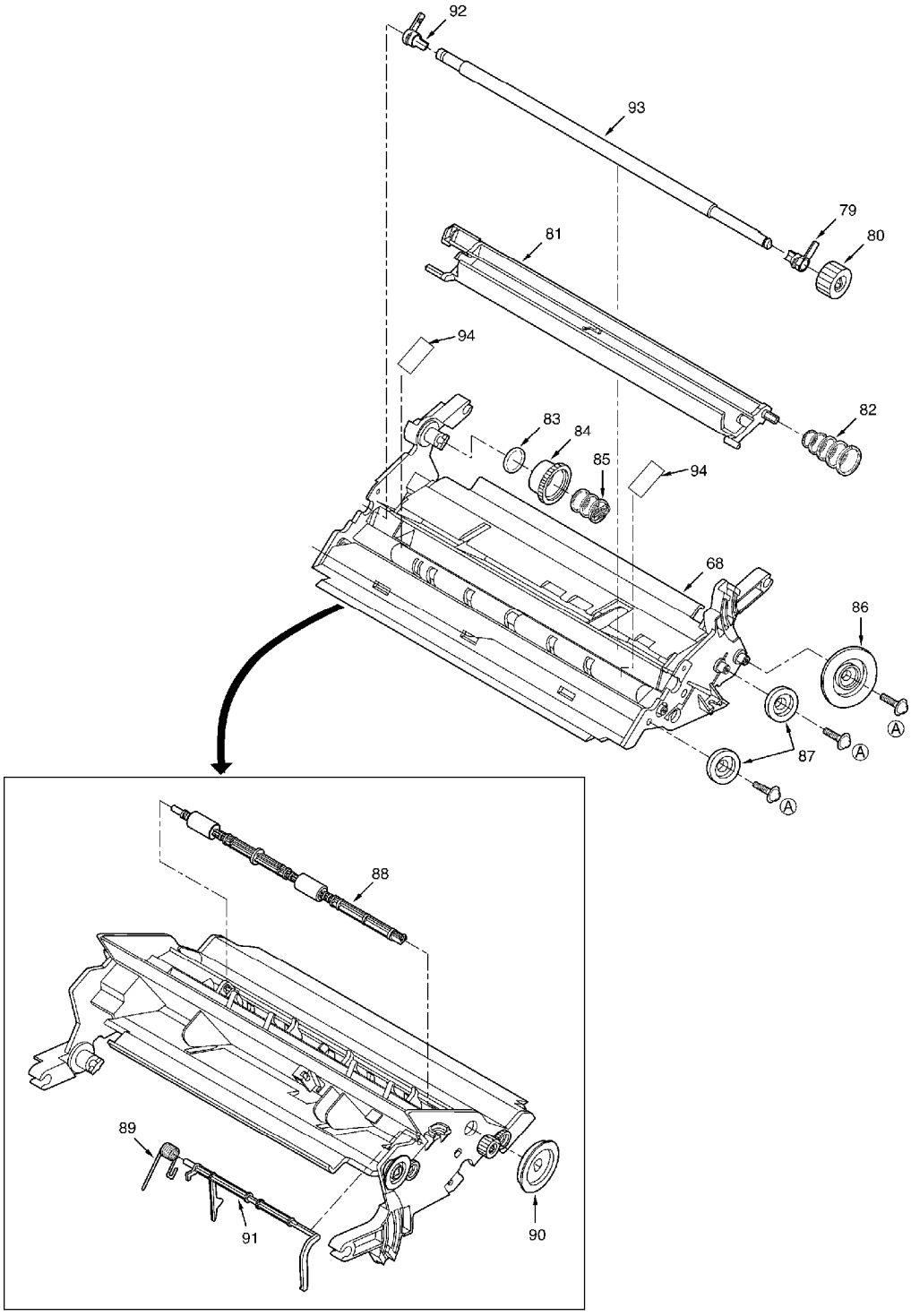


9.2.1. BACK COVER SECTION

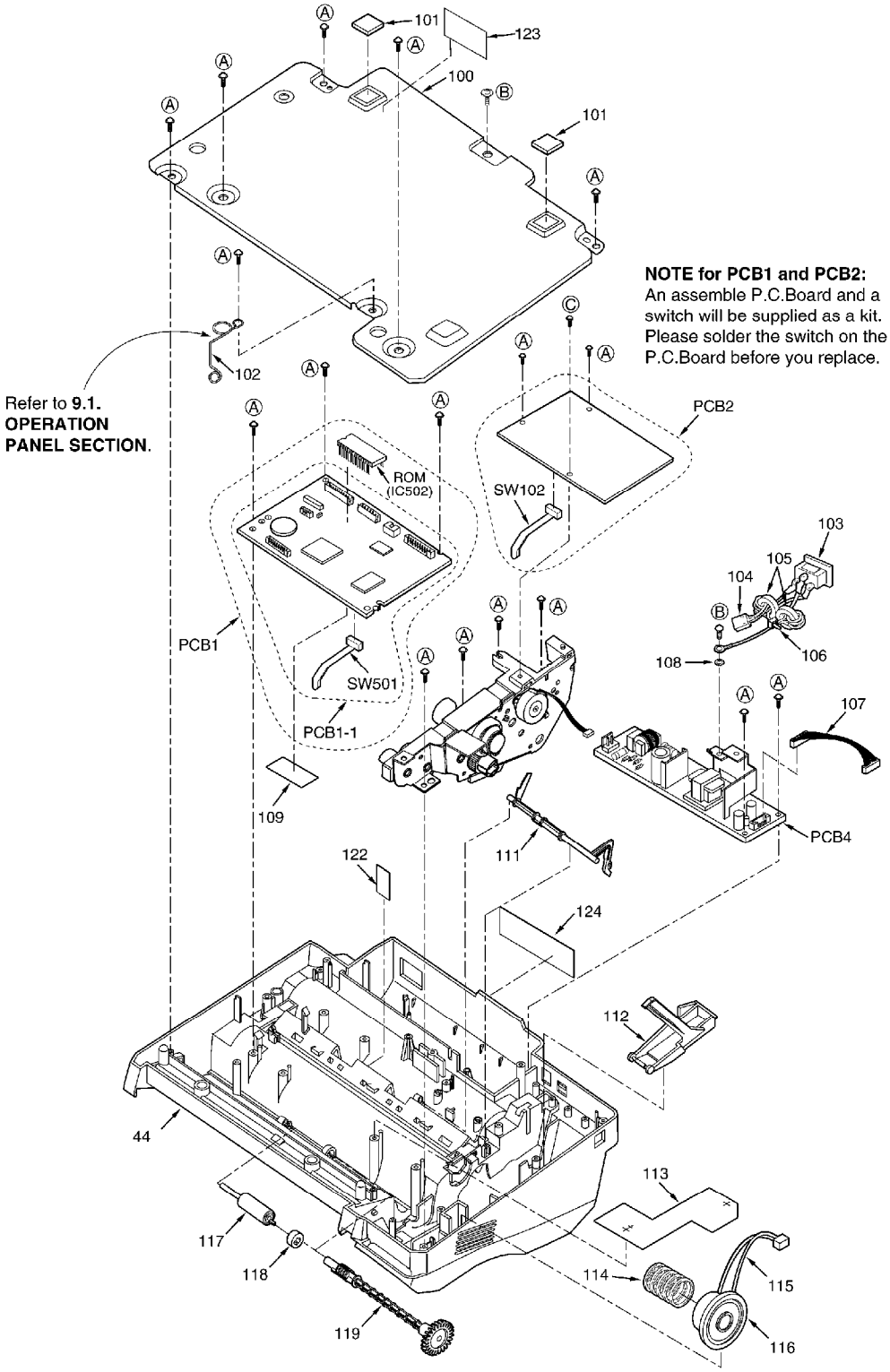
9.2.1.1. BACK COVER 1



9.2.1.2. BACK COVER 2



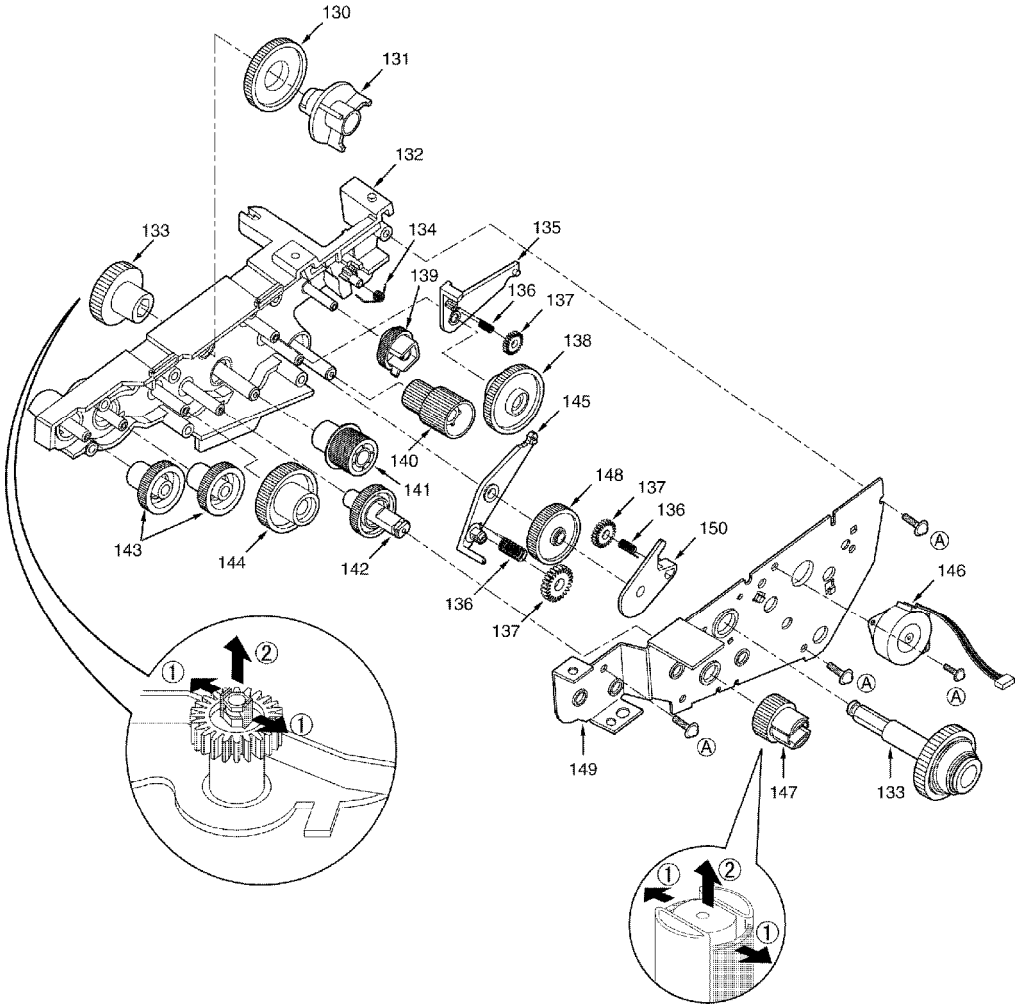
9.3. LOWER/P.C.B. SECTION



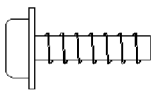
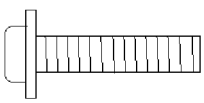
CROSS REFERENCE:

9.1. OPERATION PANEL SECTION()

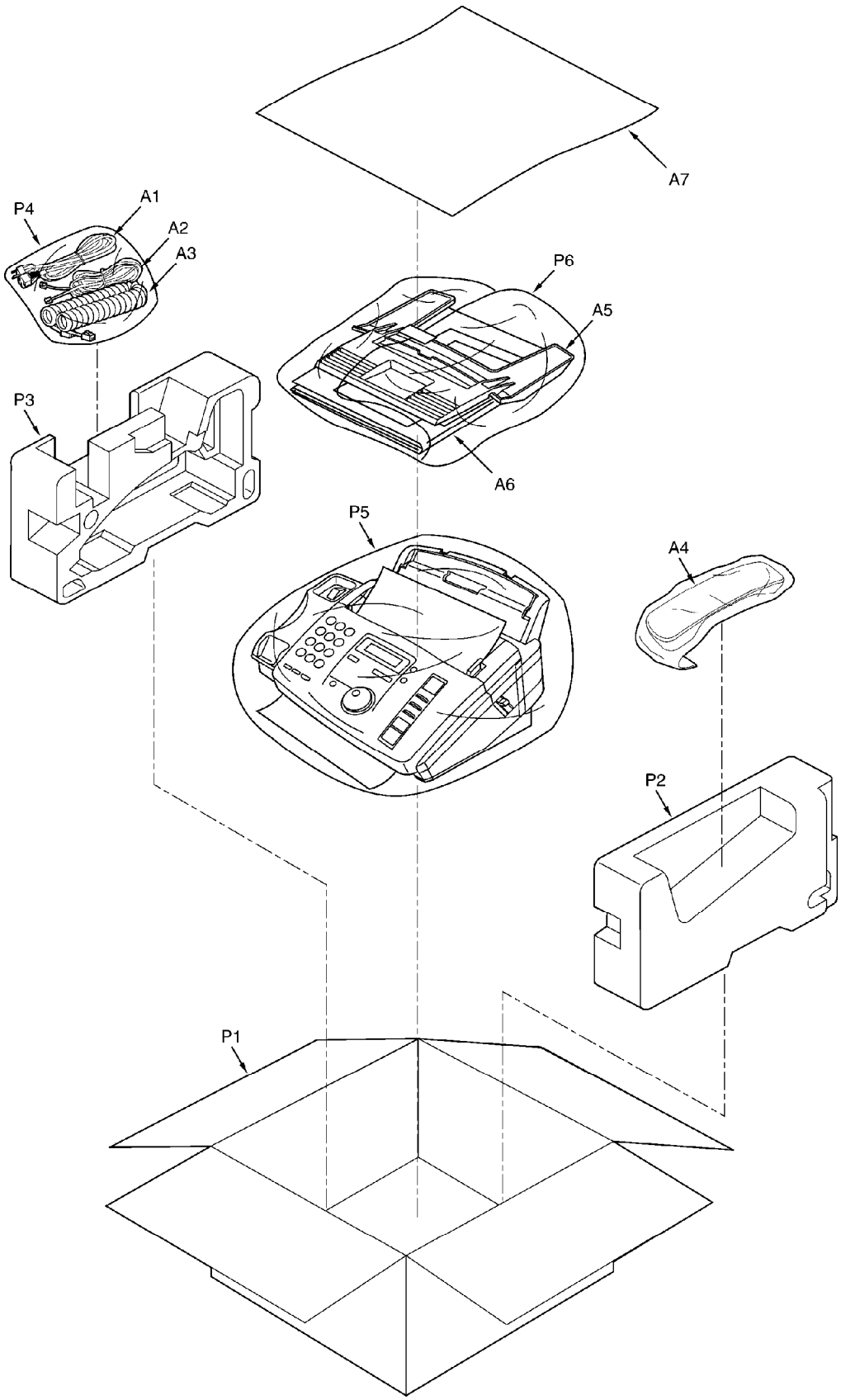
9.4. MOTOR SECTION



9.5. ACTUAL SIZE OF SCREWS AND WASHER

	Part No.	Illustration
Ⓐ	XTW3+S10P	
Ⓑ	XSB4+6	
Ⓒ	XTW3+U14L	

10. ACCESSORIES AND PACKING MATERIALS



11. REPLACEMENT PARTS LIST

This replacement parts list is for KX-FP80C only.
Refer to the simplified manual (cover) for other areas.
Notes:

1. **The marking (RTL) indicates that the Retention Time is limited for this item.**
   After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing parts and product retention.
   After the end of this period, the assembly will no longer be available.
2. **Important safety notice / Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacture's specified parts.**
3. **The S mark indicates service standard parts and may differ from production parts.**
4. **RESISTORS & CAPACITORS / Unless otherwise specified; / All resistors are in ohms (Ω) K=1000 Ω , M=1000k Ω / All capacitors are in MICRO FARADS (μ F) P= μ μ F / *Type & Wattage of Resistor**

```
NOTATION PUBLIC "-//ALDUS//NOTATION TAGGED IMAGE FILE FORMAT//EN"
ENTITY SYSTEM "\\OSC_SERVER\SM_SGML\FAX\FP80\Partlist.tif"
```

11.1. CABINET AND ELECTRICAL PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
		(11.1.1. OPERATION PANEL SECTION)	
1	PFGP1162T	PANEL, LCD	
2	PFBE1005Z1	KNOB, JOG DIAL	
3	PFGG1045P1	GRILLE, OPERATION PANEL	
4	PFDN1040Z	ROLLER, DOCUMENT EXIT	
5	PFHG1075Z	SPACER, DOCUMENT SEPARATION	
6	PFDG1148Z	GEAR, DOCUMENT EXIT ROLLER	
7	PFUS1229Z	SPRING, DOCUMENT SEP	
8	PFHR1182Y	ROLLER, DOCUMENT ADJUST	
9	PFUV1027X	COVER, OPERATION PANEL	
10	PFHX1373Z	INSULATOR, SEPATION RUBBER	
11	PFJS11Q70Z	CONNECTOR, 11P	
12	PFBX1096X1	BUTTON, STOP/VOLUME	
13	PFBX1097V1	BUTTON, FUNCTION	
14	PFBX1095Y1	BUTTON, DIALER	
15	PFBC1057Y1	BUTTON, START	
16	PFBC1058Y1	BUTTON, SP-PHONE	
		(11.1.2. UPPER CABINET SECTION)	
30	PFHX1350Z	SPACER, THERMAL HEAD	
31	PFJS11Q69Z	CONNECTOR, 11P	
32	PFHR1189Z	GUIDE, THERMAL HEAD (LEFT)	
33	PFJHS019Z	PRINTER UNIT, THERMAL HEAD	
34	PFHR1190Z	GUIDE, THERMAL HEAD (RIGHT)	
35	PFHR1192Y	COVER, THERMAL HEAD	
36	PFHX1342X	INSULATOR, STATIC ELEC. (RIGHT)	
37	PFQT1666Z	LABEL, BLUE GEAR	
38	PFHX1343Z	INSULATOR, STATIC ELEC.	
39	PFUS1235Z	SPRING, THERMAL HEAD	
40	PFUS1254Z	SPRING, POP UP	
41	PFUS1236Z	SPRING, OPERATION PANEL LOCK	
42	PFUS1233Z	SPRING, CIS	
43	PFJS10Q72Z	CONNECTOR, 10P	
44	PFKM1057Z1	CABINET, MAIN	
45	PF0U1022Z	PHOTO ELECTRIC TRANSDUCER, IMAGE SENSOR(CIS)	
46	PFHX1344Z	INSULATOR, STATIC ELEC.	
47	PFPE1075Z	SHEET PAPER, INK RIBBON (10M)	
48	PFHX1374Z	INSULATOR, CIS	
		(11.1.3. BACK COVER SECTION-1)	
60	PFDE1126Z1	LEVER, CASSETTE	
61	Not Used		
62	PFQT1642W	LABEL, PAPER SET	
63	PFUS1238Z	SPRING, PICKUP	
64	PFKS1039Z	TRAY, CASSETE	

Ref. No.	Part No.	Part Name & Description	Remarks
65	PFKV1025Y1	COVER, UPPER TURN	
66	PFHG1088Z	RUBBER, PAPER SEPARATION	
67	PFHX1339Z	INSULATOR, STATIC	
68	PFUA1025W	CHASSIS, UPPER TURN	
69	PFUS1244Z	SPRING, EARTH	
70	PFHR1187Z	GUIDE, CORNER (LEFT)	
71	PFHR1188Z	GUIDE, CORNER (RIGHT)	
72	PFDN1042Z	ROLLER, PICKUP	
73	PFDG1163Z	GEAR, PICKUP ROLLER	
74	PFKR1017Z1	GUIDE, DOCUMENT (RIGHT)	
75	PFDR1012Z	ROLLER, SUPPORT	
76	PFUS1234Z	SPRING, EXIT. SUB ROLLER	
77	PFKR1016Z1	GUIDE, DOCUMENT (LEFT)	
78	PFDG1161Z	GEAR, DOCUMENT GUIDE	
		(11.1.4. BACK COVER SECTION-2)	
79	PFDJ1030Z	SPACER,PLATEN (RIGHT)	
80	PFDG1165Y	GEAR, PLATEN	
81	PFDE1130Y1	LEVER, LOCK	
82	PFUS1258Z	SPRING, LOCK LEVER	
83	PFHS1029Z	COVER, BACK TENSION SHEET	
84	PFDG1160Z	GEAR, BACK TENSION	
85	PFUS1232Z	SPRING, BACK TENSION	
86	PFDG1164Z	GEAR, PICKUP IDLER	
87	PFDG1166Z	GEAR, PLATEN IDLER	
88	PFDN1041Z	ROLLER, EXIT	
89	PFUS1237Z	SPRING, PAPER TOP	
90	PFDG1162Z	GEAR, EXIT ROLLER	
91	PFDE1128Y	LEVER, PAPER TOP SENSOR	
92	PFDJ1029Z	SPACER, PLATEN (LEFT)	
93	PFDN1043Z	ROLLER, PLATEN	
94	PFHX1370Z	INSULATOR, PAPER EXIT	
		(11.1.5. LOWER CABINET / P.C.B. SECTION)	
100	PFMD1044Z	FRAME, BOTTOM	
101	PFHG1050Z	RUBBER, LEG	
102	PFUS1255Y	SPRING, EARTH	
103	PFJP03S04Z	CONNECTOR, 3P	⚠
104	PQJS02Q59W	CONNECTOR, 2P	
105	PQLB1E1	INSULATOR, FERRITE CORE	S
106	PQHR945Z	BAND, LEAD BINDER	
107	PFJS07Q67Z	CONNECTOR, 7P	
108	XWC4B	WASHER	
109	PFHX1367Z	COVER, IC ROM SHEET	
110	Not Used		
111	PFDE1129Z	LEVER, PAPER TOP SENSOR	

Ref. No.	Part No.	Part Name & Description	Remarks
112	PFBH1014Z1	BUTTON, HOOK	
113	PFHX1359Y	COVER, SHEET	
114	PFUS1239Z	SPRING, SPEAKER	
115	PFJS02Q68Z	CONNECTOR, 2P	
116	PFAS50P003Z	SPEAKER	
117	PFDR1014Z	ROLLER, DOCUMENT SEPARATION	
118	PFDE1133Z	SPACER, DELAY	
119	PFDF1050Z	SHAFT, DOCUMENT SEPARATION	
120	Not Used		
121	Not Used		
122	PFHX1382Z	SPACER	
123	PFQT1436Z	IC CAUTION LABEL	
124	PFGT1251Z	C CAUTION LABEL	
		(11.1.6. MOTOR SECTION)	
130	PFDG1155Z	GEAR, E	
131	PFHR1186Z	SPACER, SUPPORT BASE	
132	PFUA1024Z	CHASSIS, GEAR BASE	
133	PFDX1022Z	GEAR, TORQUE LIMITER ASS'Y	
134	PFUS1230Z	SPRING, CAM	
135	PFHR1184Z	ARM, J	
136	PFUS1231Y	SPRING, GEAR I	
137	PFDG1159Z	GEAR, I	
138	PFDG1149Z	GEAR, A	
139	PFDG1152Z	GEAR, CAM	
140	PFDG1158Z	GEAR, H	
141	PFDG1151Z	GEAR, C	
142	PFDG1153Z	GEAR, D1	
143	PFDG1157Z	GEAR, G	
144	PFDG1156Z	GEAR, F	
145	PFHR1183Z	ARM, I	
146	PFJQ35S1S15D	DC MOTOR	S
147	PFDG1154Z	GEAR, D2	
148	PFDG1150Z	GEAR, B	
149	PFMD1043Z	FRAME, GEAR BASE COVER	
150	PFHR1185Z	ARM, V	
		(11.1.7. ACCESSORIES AND PACKING MATERIALS)	
A1	PFJA1030Z	POWER CORD	⚠
A2	PQJA10075Z	CORD, TELEPHONE	⚠
A3	PFJA1029Z	CORD, HANDSET	
A4	PFJXE0805Z	HANDSET	
A5	PFKS1040Y1	TRAY, PAPER(LETTER SIZE)	S
	PFKS1044Z1	TRAY, PAPER (LEGAL SIZE, OPTION)	S
A6	PFQX1430Z	INSTRUCTION BOOK	
A7	PFQW1366Z	INSTRUCTION BOOK (QUICK START SHEET)	
P1	PFPK1678Z-M	GIFT BOX	

Ref. No.	Part No.	Part Name & Description	Remarks
P2	PFPN1209Y	CUSHION, RIGHT	
P3	PFPN1208Z	CUSHION, LEFT	
P4	XZB20X35A04	PROTECTION COVER	
P5	PFPH1011Z	PACKING SHEET	
P6	XZB32X45A04	PROTECTION COVER	

11.2. DIGITAL BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PFWP1FP80C	DIGITAL BOARD ASS'Y (RTL)	
PCB1-1	PFWP2FP80M	DIGITAL BOARD ASS'Y (RTL) [without ROM]	
		Refer to 9.3. LOWER/P.C.B. SECTION().	
		(ICS)	
IC501	PFVIM66426M1	IC	
IC502	PFWIFP80C	IC (ROM)	
IC503	PFVIMS5148EF	IC	S
IC504	PFVIM0525LFF	IC	S
IC505	PQVIR96DFXL	IC	
IC507	PFVIXCN4202N	IC	S
IC508	PFVIT2003APS	IC	S
IC509	PFVIMC4066BT	IC	S
IC510	PFVINJM2904M	IC	S
IC511	PQVINJM4558M	IC	S
		(TRANSISTORS)	
IC506	PFVTSI4431DY	TRANSISTOR(SI)	
Q501	PQVTDTC114EU	TRANSISTOR(SI)	S
Q502	2SB1322	TRANSISTOR(SI)	S
Q503	PQVTDTC114EU	TRANSISTOR(SI)	S
Q504	2SB709A	TRANSISTOR(SI)	
Q505	2SC4155S	TRANSISTOR(SI)	S
Q507	PQVTDTC143E	TRANSISTOR(SI)	S
Q508	2SC4155S	TRANSISTOR(SI)	S
Q509	2SC4155S	TRANSISTOR(SI)	S
Q510	PQVTFB1J3P	TRANSISTOR(SI)	S
Q511	2SC4155S	TRANSISTOR(SI)	S
		(DIODES)	
D501	PFVDRMRLS245	DIODE(SI)	
D502	MA7160	DIODE(SI)	
D504	PFVDRMRLS245	DIODE(SI)	

Ref. No.	Part No.	Part Name & Description	Remarks
DA501	MA141WK	DIODE(SI)	
		(BATTERY)	
BAT501	PFSU1004Z	BATTERY	S
		(COILS)	
L506	PQLQR1ET	COIL	
L508	PQLQR1RM601	COIL	
L509	PQLQR2KA20T	COIL	
L512	PQLQR2KA20T	COIL	
		(COMPONENTS COMBINATIONS)	
RA501	EXB38V101JV	COMPONENTS PARTS	
RA502	EXB38V101JV	COMPONENTS PARTS	
RA503	EXB38V101JV	COMPONENTS PARTS	
RA504	EXB38V271JV	COMPONENTS PARTS	
RA505	EXB38V271JV	COMPONENTS PARTS	
		(CONNECTORS)	
CN501	PQJP15A19Z	CONNECTOR,15P	
CN502	PQJP5G30Z	CONNECTOR, 5P	S
CN503	PQJP10G30Y	CONNECTOR, 10P	S
CN504	PQJP11G30Y	CONNECTOR,11P	S
CN505	PQJP11G100Z	CONNECTOR,11P	
CN506	PQJP7G30Z	CONNECTOR, 7P	
		(SWITCH)	
SW501	PFSH1A001Z	SWITCH, FILM & COVER DETECTION	
		(CRYSTAL OSCILLATIONS)	
X501	PFVCCFS32Z	CRYSTAL OSCILLATOR	
X502	PFVCCSA24Z	CRYSTAL OSCILLATOR	
		(FUSE)	
F502	PFRB002122KZ	FUSE	
		(PHOTO ELECTRIC TRANSDUCER)	
PS501	PFVISG257	PHOTO ELECTRIC TRANSDUCER	

Ref. No.	Part No.	Part Name & Description	Remarks
		(RESISTORS)	
R501	ERJ3GEYJ562	5.6k	
R502	ERJ3GEYJ472	4.7k	
R508	ERJ3GEYJ102	1k	
R509	ERJ3GEY0R00	0	
R510	ERJ3GEYJ101	100	
R513	ERJ3GEYJ101	100	
R514	ERJ3GEYJ821	820	
R515	ERJ3GEYJ101	100	
R516	ERDS1VJ152	1.5k	
R517	ERJ3GEYJ102	1k	
R518	ERJ3GEYJ102	1k	
R519	ERJ3GEYJ473	47k	
R520	ERJ3GEYJ473	47k	
R522	ERJ3GEYJ223	22k	
R523	ERJ3GEYJ823	82k	
R524	ERJ3GEYJ562	5.6k	
R525	ERJ3GEYJ563	56k	
R527	ERJ3GEYJ331	330	
R528	ERJ3GEYJ472	4.7k	
R529	ERJ3GEYJ103	10k	
R530	ERJ3GEYJ101	100	
R532	ERJ3GEYJ103	10k	
R533	ERJ3GEYJ203	20k	
R534	ERJ3GEYJ472	4.7k	
R535	ERJ3GEYJ103	10k	
R538	ERJ3GEYJ101	100	
R539	ERJ3GEYJ101	100	
R540	ERJ3GEYJ101	100	
R541	ERJ3GEYJ222	2.2k	
R542	ERJ3GEYJ101	100	
R543	ERJ3GEYJ471	470	
R544	ERJ3EKF1101	1.1k	
R545	ERJ3EKF4701	4.7k	
R546	ERJ3GEY0R00	0	
R548	ERJ3GEYJ103	10k	
R549	ERJ3GEY0R00	0	
R550	ERJ3GEYJ103	10k	
R552	ERJ3GEYJ270	27	
R553	ERJ3GEYJ105	1M	
R556	ERJ3GEY0R00	0	
R557	ERJ3GEYJ271	270	
R558	ERJ3GEYJ183	18k	
R559	ERJ3GEYJ123	12k	
R560	ERJ3GEYJ682	6.8k	

Ref. No.	Part No.	Part Name & Description	Remarks
R561	ERJ3GEYJ472	4.7k	
R562	ERJ3GEYJ271	270	
R563	ERJ3GEYJ224	220k	
R564	ERJ3GEYJ103	10k	
R565	ERJ3GEYJ823	82k	
R566	ERJ3GEYJ102	1k	
R568	ERJ3GEYJ103	10k	
R569	ERJ3GEYJ103	10k	
R570	ERJ3GEYJ123	12k	
R571	ERJ3GEYJ474	470k	
R572	ERJ3GEYJ104	100k	
R573	ERJ6ENF4752	4.7M	S
R574	ERJ3GEYJ473	47k	
R575	ERJ3GEYJ103	10k	
R576	ERJ3GEYJ332	3.3k	
R578	PQ4R18XJ220	22	
R579	ERJ3GEYJ473	47k	
R580	ERJ3GEYJ333	33k	
R581	ERJ3GEYJ103	10k	
R582	ERJ3GEYJ682	6.8k	
R583	ERJ3GEYJ153	15k	
R584	ERJ3GEYJ562	5.6k	
R585	ERJ3GEYJ114	110k	
R586	ERJ3GEYJ392	3.9k	
R587	ERJ3GEYJ123	12k	
R588	ERJ3GEYJ224	220k	
R589	ERJ3GEYJ224	220k	
R590	ERJ3GEYJ224	220k	
R591	ERJ3GEYJ105	1M	
R592	ERJ3GEYJ683	68k	
R593	ERJ3GEYJ473	47k	
R594	ERJ3GEYJ222	2.2k	
R595	ERJ3GEYJ105	1M	
R596	ERJ3GEYJ222	2.2k	
R597	ERJ3GEYJ222	2.2k	
R598	ERJ3GEYJ472	4.7k	
R599	ERJ3GEYJ121	120	
R600	ERJ3GEYJ473	47k	
R601	ERJ3GEYJ103	10k	
R603	ERJ1WYJ391	390	
		(CAPACITORS)	
C502	ECUV1H104ZFV	0.1	S
C503	ECEA1CK101	100	S
C505	PQCUV1H473MD	0.047	S
C506	ECUV1H102KBV	0.001	
C507	ECUV1H102KBV	0.001	
C508	ECUV1H102KBV	0.001	S

Ref. No.	Part No.	Part Name & Description	Remarks
C509	ECUV1H561JCV	560P	
			S
C510	ECUV1H104ZFV	0.1	S
C511	ECUV1H103KBV	0.01	
C512	ECUV1H102KBV	0.001	
C513	ECUV1H104ZFV	0.1	S
C514	ECUV1H104ZFV	0.1	S
C515	ECUV1H104ZFV	0.1	S
C516	ECUV1H104ZFV	0.1	S
C517	ECUV1H104ZFV	0.1	S
C518	ECUV1H222KBV	0.0022	
C519	ECUV1C104KBV	0.1	
C520	ECUV1H104ZFV	0.1	S
C522	ECUV1C104KBV	0.1	
C523	ECUV1H120JCV	12P	
C524	ECUV1H104ZFV	0.1	S
C525	ECUV1H180JCV	18P	
C527	ECUV1H104ZFV	0.1	S
C528	ECUV1H104ZFV	0.1	S
C529	ECUV1H104ZFV	0.1	S
C530	ECUV1H104ZFV	0.1	S
C531	ECUV1H104ZFV	0.1	S
C533	ECUV1H104ZFV	0.1	S
C534	ECUV1H104ZFV	0.1	S
C535	ECUV1H104ZFV	0.1	S
C536	ECUV1H104ZFV	0.1	S
C537	ECUV1H104ZFV	0.1	S
C538	ECUV1H104ZFV	0.1	S
C540	ECUV1H100DCV	10P	S
C541	ECUV1H120JCV	12P	
C542	ECUV1H104ZFV	0.1	S
C543	ECUV1H104ZFV	0.1	S
C544	ECUV1H104ZFV	0.1	S
C545	ECUV1H104ZFV	0.1	S
C547	ECUV1H104ZFV	0.1	S
C548	ECEA1CK101	100	S
C549	ECUV1C104KBV	0.1	
C550	ECUV1H330JCV	33P	
C551	ECEA1CKS100	10	S
C552	ECUV1H103KBV	0.01	
C553	ECUV1H102KBV	0.001	
C554	ECUV1H102KBV	0.001	
C556	ECUV1H102KBV	0.001	
C557	ECUV1C104KBV	0.1	
C558	ECUV1H104ZFV	0.1	S
C559	ECUV1H104ZFV	0.1	S
C560	ECUV1H104ZFV	0.1	S
C561	ECUV1H182KBV	0.0018	
C564	ECUV1H104ZFV	0.1	S

Ref. No.	Part No.	Part Name & Description	Remarks
C565	ECUV1H331JCV	330P	S
C566	ECEA1CK101	100	S
C567	ECUV1H222KBV	0.0022	
C568	ECUV1H103KBV	0.01	
C570	ECUV1C683KBV	0.068	
C571	ECUV1C104KBV	0.1	
C572	ECUV1C104KBV	0.1	
C573	ECUV1C104KBV	0.1	
C574	ECEA0JK221	220	S
C575	ECUV1C104KBV	0.1	
C576	ECUV1C104KBV	0.1	
C577	ECUV1C123KBV	0.012	
C578	ECUV1H104ZFV	0.1	S
C579	ECUV1C104KBV	0.1	
C580	ECUV1H101JCV	100P	
C581	ECUV1C104KBV	0.1	
C582	ECUV1H104ZFV	0.1	S
C583	ECUV1H331JCV	330P	S
C584	ECUV1H681KBV	680P	
C585	ECUV1H104ZFV	0.1	S
C586	ECUV1C104KBV	0.1	
C588	ECEA1HKS100	10	S
C589	ECUV1H104ZFV	0.1	S
C591	ECUV1H104ZFV	0.1	S
C592	ECUV1H104ZFV	0.1	S

11.3. ANALOG BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PFWP3FP80M	ANALOG BOARD ASS'Y (RTL)	⚠
		Refer to 9.3. LOWER/P.C.B. SECTION().	
		(ICS)	
IC101	PFVINJM2904M	IC	S
IC102	PQVINJM2113M	IC	S
		(TRANSISTORS)	
Q101	2SC4155S	TRANSISTOR(SI)	S
Q102	2SC4155R	TRANSISTOR(SI)	S
Q103	PQVTDTC143E	TRANSISTOR(SI)	S
		(DIODES)	
D101	MA4056	DIODE(SI)	S
D102	MA4056	DIODE(SI)	S
D103	1SS119	DIODE(SI)	S
D104	1SS119	DIODE(SI)	S
D105	1SS119	DIODE(SI)	S
		(COILS)	
L101	PFVF2B182SDT	COIL	
L102	PFVF2B182SDT	COIL	
L104	PFVF2B182SDT	COIL	
L105	PFVF2B182SDT	COIL	
L106	PQLQR2KA113T	COIL	S
L107	PQLQR2KA113T	COIL	S
L108	PQLQR2KA113T	COIL	S
L109	PQLQR2KA113T	COIL	S
		(CONNECTORS)	
CN101	PQJS15A10Z	CONNECTOR, 15P	
CN105	PQJP02G100Z	CONNECTOR, 2P	
		(JACKS)	
CN102	PFJJ1T01Z	JACK	S
CN103	PFJJ1T01Z	JACK	S
CN104	PQJJ1TB18Z	JACK	
		(PHOTO ELECTRIC TRANSDUCERS)	
PC101	CNC7S102	PHOTO ELECTRIC TRANSDUCER	⚠ S

Ref. No.	Part No.	Part Name & Description	Remarks
PC102	PQVIPC814K	PHOTO ELECTRIC TRANSDUCER	⚠ S
		(SWITCHES)	
SW101	ESE14A211	SWITCH	
SW102	PFSH1A002Z	SWITCH	
		(VARISTORS)	
SA101	PFRZRA311P6T	VARISTOR	⚠ S
SA102	PFVDRA102M	VARISTOR	⚠ S
		(THERMISTOR)	
POS101	PFRT002	THERMISTOR	⚠
		(RELAY)	
RL101	PFSL001Z	RELAY	⚠
		(TRANSFORMER)	
T101	PFLT8E010	TRANSFORMER	⚠
		(RESISTORS)	
R101	ERG2SJ151	150	
R102	ERDS2TJ271	270	
R103	ERDS1TJ473	47k	S
R104	ERDS1VJ103	10k	
R110	ERDS2TJ331	330	
R111	ERJ3GEYJ104	100k	
R112	ERJ3GEYJ124	120k	
R113	ERJ3GEYJ303	30k	
R115	ERJ3GEY0R00	0	
R116	ERJ3GEYJ104	100k	
R118	ERJ3GEYJ224	220k	
R119	ERJ3GEYJ224	220k	
R120	ERJ3GEYJ222	2.2k	
R121	ERJ3GEYJ331	330	
R122	ERJ3GEYJ152	1.5k	
R123	ERJ3GEYJ152	1.5k	
R124	ERJ3GEYJ183	18k	
R125	ERJ3GEYJ183	18k	
R126	ERJ3GEYJ334	330k	
R127	ERJ3GEYJ334	330k	

Ref. No.	Part No.	Part Name & Description	Remarks
R128	ERJ3GEYJ222	2.2k	
R129	ERJ3GEYJ101	100	
R130	ERJ3GEYJ331	330	
R131	ERJ3GEYJ473	47k	
R132	ERJ3GEYJ223	22k	
R133	ERJ3GEYJ103	10k	
R134	ERJ3GEYJ103	10k	
R135	ERJ6GEY0R00	0	
R136	ERJ3GEYJ154	150k	
R137	ERJ3GEYJ114	110k	
R138	ERJ3GEYJ562	5.6k	
R139	ERJ3GEYJ564	560k	
R140	ERJ3GEYJ334	330k	
R141	ERJ3GEYJ103	10k	
R142	ERJ3GEYJ273	27k	
R143	ERJ3GEYJ472	4.7k	
R144	ERJ3GEYJ101	100	
R145	ERJ3GEYJ472	4.7k	
R146	ERJ3GEYJ101	100	
R150	ERJ3GEYJ123	12k	
R151	ERJ3GEYJ682	6.8k	
R157	ERJ3GEYJ103	10k	
R158	ERJ3GEYJ103	10k	
		(CAPACITORS)	
C101	ECQE2E105KZ	1	S
C102	PQCUV1H333JC	0.033	S
C110	ECUV1H103KBV	0.01	
C111	ECUV1C104KBV	0.1	
C112	ECUV1H123KBV	0.012	
C113	ECUV1H103KBV	0.01	
C114	ECUV1H561JCV	560P	S
C115	ECUV1H820JCV	82P	
C117	ECEA1HKS100	10	S
C118	ECEA1CKS470	47	S
C119	ECUV1H103KBV	0.01	
C120	ECUV1H103KBV	0.01	
C121	ECUV1H103KBV	0.01	
C122	ECUV1C683KBV	0.068	
C123	ECUV1C683KBV	0.068	
C124	ECUV1H271JCV	270P	
C126	ECEA1CKS100	10	S
C127	ECEA1CKS470	47	S
C128	ECUV1H472KBV	0.0047	
C130	ECEA1HKS4R7	4.7	S
C131	ECUV1C273KBV	0.027	

Ref. No.	Part No.	Part Name & Description	Remarks
C132	ECUV1H102KBV	0.001	
C134	PQCUV1E104MD	0.1	S
C135	ECUV1H104ZFV	0.1	S
C136	ECUV1H153KBV	0.015	
C140	ECUV1H103KBV	0.01	
C141	ECUV1H103KBV	0.01	
C151	ECEA1CKS470	47	S
C154	ECUV1H681KBV	680P	
C155	ECUV1H681KBV	680P	

11.4. OPERATION BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB3	PFWP4FP81C	OPERATION BOARD ASS'Y (RTL)	
		Refer to 9.1. OPERATION PANEL SECTION().	
		(IC)	
IC301	MN7D032Z9J	IC	
		(CONNECTOR)	
CN301	PQJP11G43Z	CONNECTOR,11P	
		(SWITCHES)	
SW352	PFSH1A002Z	SWITCH, DOCUMENT TOP	
SW353	PFSH1A002Z	SWITCH, DOCUMENT TOP	
		(LIQUID CRYSTAL DISPLAY)	
CN302	PFAVM190B	LIQUID CRYSTAL DISPLAY	
		(RESISTORS)	
R301	ERJ3GEYJ471	470	
R302	ERJ3GEYJ471	470	
R303	ERJ3GEYJ273	27k	
R305	ERJ3GEYJ681	680	
R314	ERJ3GEYJ472	4.7k	
R315	ERJ3GEYJ101	100	

Ref. No.	Part No.	Part Name & Description	Remarks
R382	ERDS2TJ101	100	C
R316	ERJ3GEYJ472	4.7k	
R317	ERJ3GEYJ101	100	
R318	ERJ3GEYJ4R7V	4.7	
		(CAPACITORS)	
C302	ECUV1C104KBV	0.1	S
C303	ECEA0JKS101	100	
C304	ECUV1C104KBV	0.1	S
C310	ECUV1C104KBV	0.1	S
C311	ECUV1C104KBV	0.1	S
C314	ECUV1C104KBV	0.1	S
C305	ECUV1H331JCV	330P	
C361	PQCBS1H331KB	330P	C
C308	ECUV1H331JCV	330P	
C309	ECUV1H331JCV	330P	
C316	ECUV1H103KBV	0.01	
C317	ECUV1H103KBV	0.01	
		(SWITCHES)	
SW302	PQSH1A105Z	SWITCH	
SW303	PQSH1A105Z	SWITCH	
SW304	PQSH1A105Z	SWITCH	
SW305	PQSH1A105Z	SWITCH	
SW306	PQSH1A105Z	SWITCH	
SW307	PQSH1A105Z	SWITCH	
SW308	PQSH1A105Z	SWITCH	
SW309	PQSH1A105Z	SWITCH	
SW310	PQSH1A105Z	SWITCH	
SW311	PQSH1A105Z	SWITCH	
SW312	PQSH1A105Z	SWITCH	
SW313	PQSH1A105Z	SWITCH	
SW314	PQSH1A105Z	SWITCH	
SW315	PQSH1A105Z	SWITCH	
SW316	PQSH1A105Z	SWITCH	
SW317	PQSH1A105Z	SWITCH	
SW318	PQSH1A105Z	SWITCH	
SW319	PQSH1A105Z	SWITCH	

Ref. No.	Part No.	Part Name & Description	Remarks
SW320	PQSH1A105Z	SWITCH	
SW322	PQSH1A105Z	SWITCH	
SW323	PQSH1A105Z	SWITCH	
SW324	PQSH1A105Z	SWITCH	
SW326	PQSH1A105Z	SWITCH	
SW329	PQSH1A105Z	SWITCH	
SW330	PQSH1A105Z	SWITCH	
SW333	PQSH1A105Z	SWITCH	
SW334	PQSH1A105Z	SWITCH	
SW335	PQSH1A105Z	SWITCH	
SW351	EVEGB141112B	SWITCH	

11.5. POWER SUPPLY BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB4	PFLP1282MZL	POWER SUPPLY BOARD ASS'Y (RTL)	⚠
		(ICS)	
IC101	PFVIFA5317P	IC	
IC201	AN1431T	IC	
IC202	PFVITA7805F	IC	S
		(TRANSISTORS)	
Q101	2SK2640	TRANSISTOR(SI)	⚠
		(DIODES)	
D101	PFVD1N4005	DIODE(SI)	⚠ S
D102	PFVD1N4005	DIODE(SI)	⚠ S
D103	PFVD1N4005	DIODE(SI)	⚠ S
D104	PFVD1N4005	DIODE(SI)	⚠ S
D105	PFVDAG01A	DIODE(SI)	
D106	MA165	DIODE(SI)	
D107	MA4220	DIODE(SI)	
D108	PQVDERA1802	DIODE(SI)	S
D201	PFVDSF5LC20U	DIODE(SI)	S
D202	PFVDD1NL20U	DIODE(SI)	S
		(COIL)	
L101	ELF15N007A	COIL	⚠

Ref. No.	Part No.	Part Name & Description	Remarks
		(COMPONENTS PARTS)	
L103	EXCELDR35	COMPONENTS PARTS	
		(CONNECTORS)	
CN31	PQJP2D98Z	CONNECTOR, 2PIN	⚠
CN301	PQJP7G30Z	CONNECTOR, 7PIN	⚠
		(FUSE)	
F101	PQBA1C50NBKL	FUSE	⚠ S
		(PHOTO ELECTRIC TRANSDUCERS)	
PC101	0N3131SKU	PHOTO ELECTRIC TRANSDUCER	⚠ S
		(TRANSFORMER)	
T101	PFLTSRW2820E	TRANSFORMER	⚠ S
		(VARIABLE RESISTOR)	
VR201	EVNDJAA03B53	VARIABLE RESISTOR	
		(VARISTOR)	
ZNR101	ERZV10DK471U	VARISTOR	⚠
		(RESISTORS)	
R101	ERDS2TJ105	1M	⚠
R102	ERDS2TJ334	330k	
R103	ERDS2TJ334	330k	
R104	ERG1SJ104	100k	
R105	ERX2SJR22	0.22	
R106	ERG2SJ470	47	
R108	ERDS2FJ150	15	
R109	ERDS2TJ220	22	
R121	PQ4R10XJ103	10k	S
R122	ERJ6GEYJ621	620	
R124	PQ4R10XJ181	180	S
R125	PQ4R10XJ103	10k	S
R126	PQ4R10XJ562	5.6k	S
R127	PQ4R10XJ182	1.8k	S
R128	PQ4R10XJ181	180	

Ref. No.	Part No.	Part Name & Description	Remarks
R136	PQ4R10XJ393	39k	S
R137	PQ4R10XJ393	39k	S
R202	ERG2SJ152	1.5k	
R203	ERDS2FJ470	47	
R221	PQ4R10XJ222	2.2k	S
R222	PQ4R10XJ222	2.2k	S
R223	PQ4R10XJ101	100	S
R224	PQ4R10XJ273	27k	S
R225	PQ4R10XJ332	3.3k	S
		(CAPACITORS)	
C101	ECQU2A104MV	0.1	⚠
C102	ECQU2A473MG	0.047	⚠
C103	PFKDE2GA102K	0.001	S
C105	PFKDE2GA222M	0.0022	⚠
C106	PFEU200SX180	180	S
C108	ECKD3A102KBP	0.001	
C109	ECA1VHG470	47	
C119	ECKD3A221KBP	220P	
C121	ECUV1H472KBN	0.0047	
C122	ECUV1C224KBX	0.22	
C123	ECUV1H561KBM	560P	
C124	ECUV1H104KBW	0.1	S
C201	PFCEA35F471	470	S
C202	ECKD3A102KBP	0.001	
C203	PFCEA16A470	470	S
C204	PFCEA35A47M	47	S
C205	PFCEA50A1M	1	S
C206	ECKD3A102KBP	0.001	

11.6. FIXTURES AND TOOLS

Ref. No.	Part No.	Part Name & Description	Remarks
EC1	PQZZ2K12Z	CONNECTOR, 2P	
EC2	PFZZ10K1Z	CONNECTOR, 10P	
EC3	PFZZ15K1Z	CONNECTOR, 15P	
EC4	PQZZ7K5Z	CONNECTOR, 7P	
EC5	PFZZ11K13Z	CONNECTOR, 11P	
EC6	PFZZ5K13Z	CONNECTOR, 5P	
EC7	PQZZ11K4Z	CONNECTOR, 11P	
EC8	PQZZ2K13Z	CONNECTOR, 2P	
	KM79811245C0	BASIC FACSIMILE TECHNIQUE	
		(for training service technicians)	

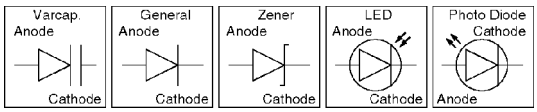
Note:

Tools and Extension Cords are useful for servicing.
(They make servicing easy.)

12. FOR THE SCHEMATIC DIAGRAMS

Note:

1. **DC voltage measurements are taken with an oscilloscope or a tester with a ground.**
2. **The schematic diagrams and circuit board may be modified at any time with the development of new technology.**
3.



Important safety notice
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

13. PRINTED CIRCUIT BOARD

13.1. DIGITAL BOARD: BOTTOM VIEW

13.2. DIGITAL BOARD: COMPONENT VIEW

13.3. ANALOG BOARD: BOTTOM VIEW

13.4. ANALOG BOARD: COMPONENT VIEW

13.5. OPERATION BOARD

13.6. POWER SUPPLY BOARD

14. SCHEMATIC DIAGRAM

14.1. DIGITAL BOARD

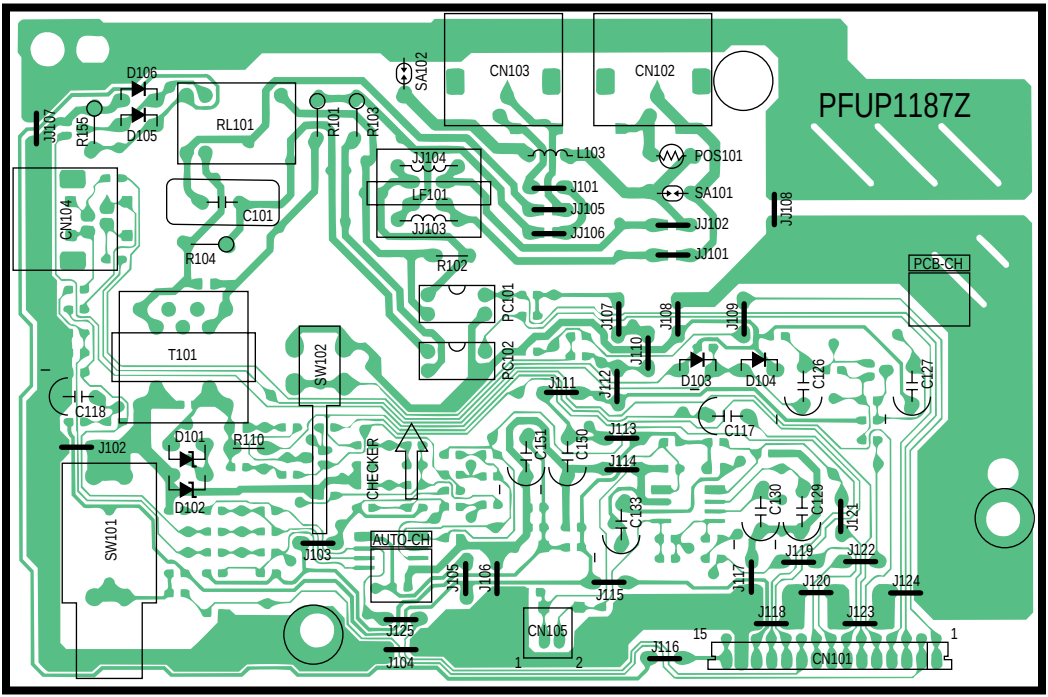
14.2. ANALOG BOARD

14.3. OPERATION BOARD

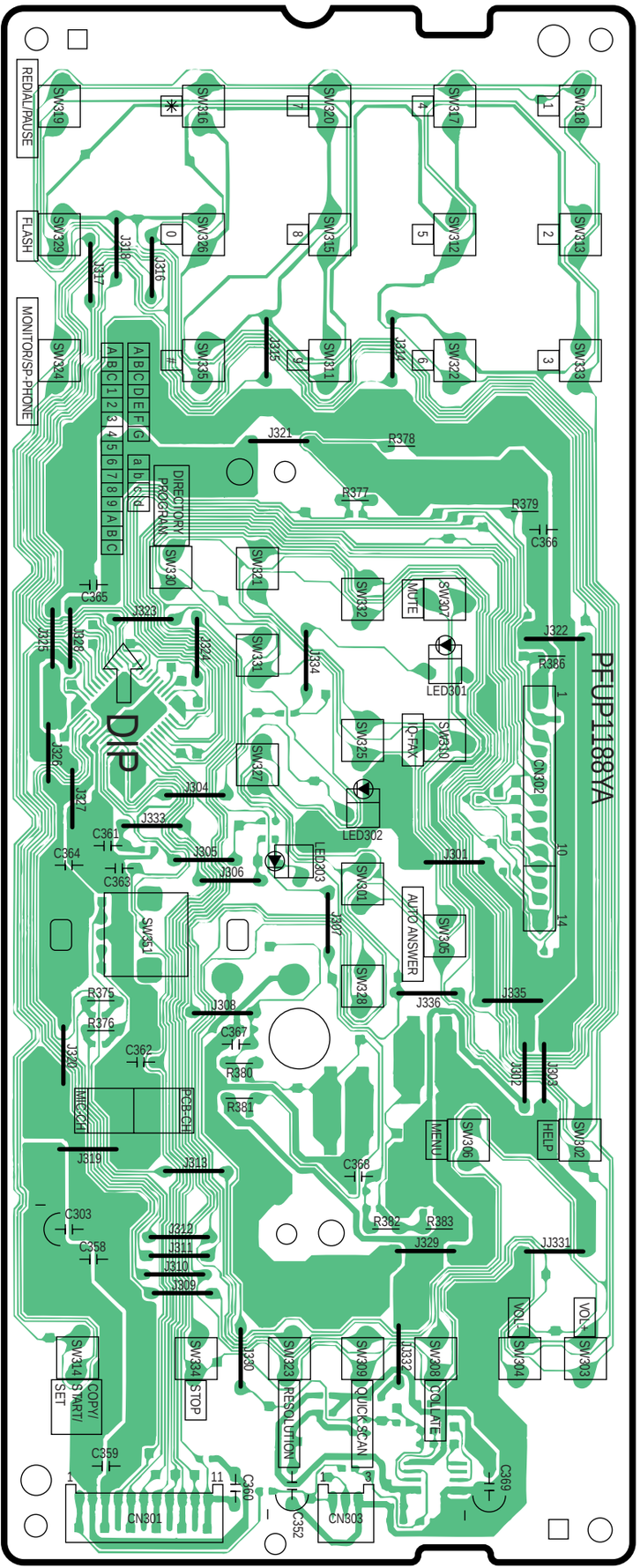
14.4. POWER SUPPLY BOARD

TN (Q) KXFP80C /

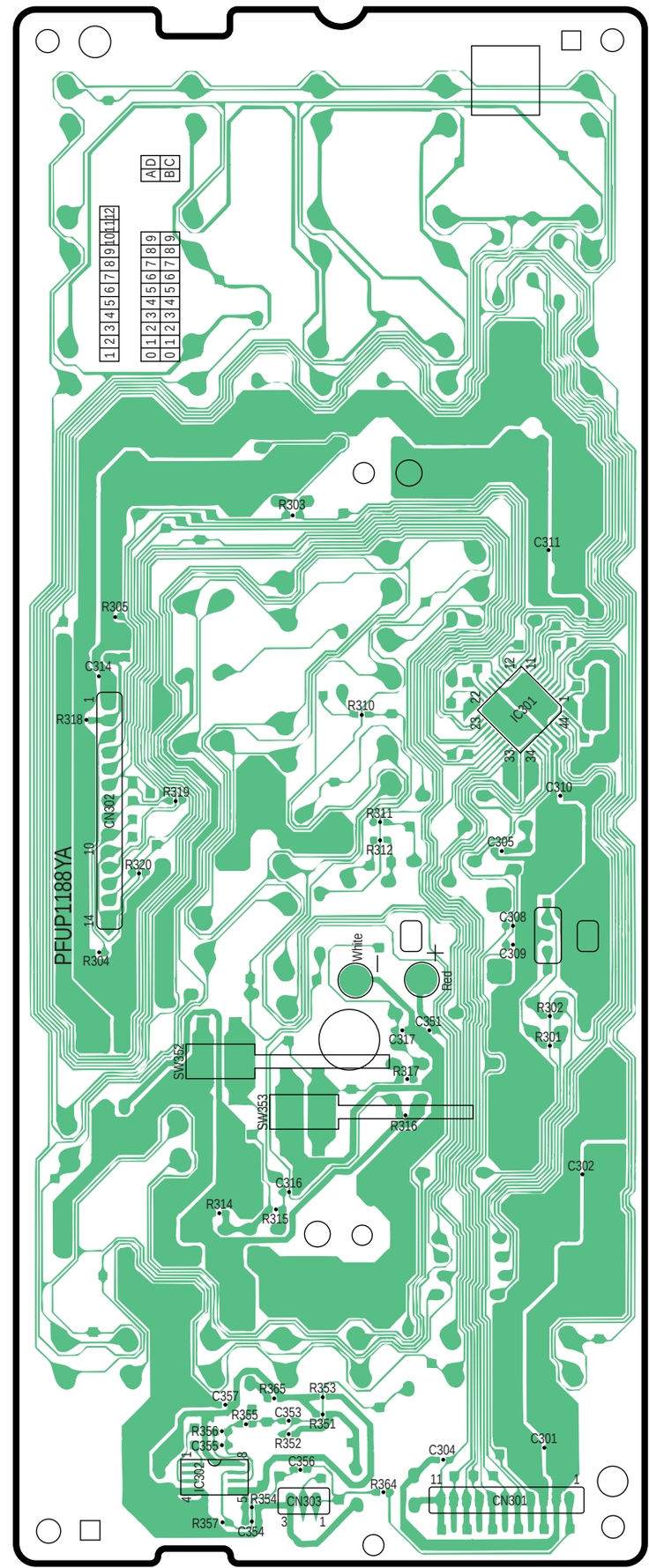
(COMPONENT VIEW)



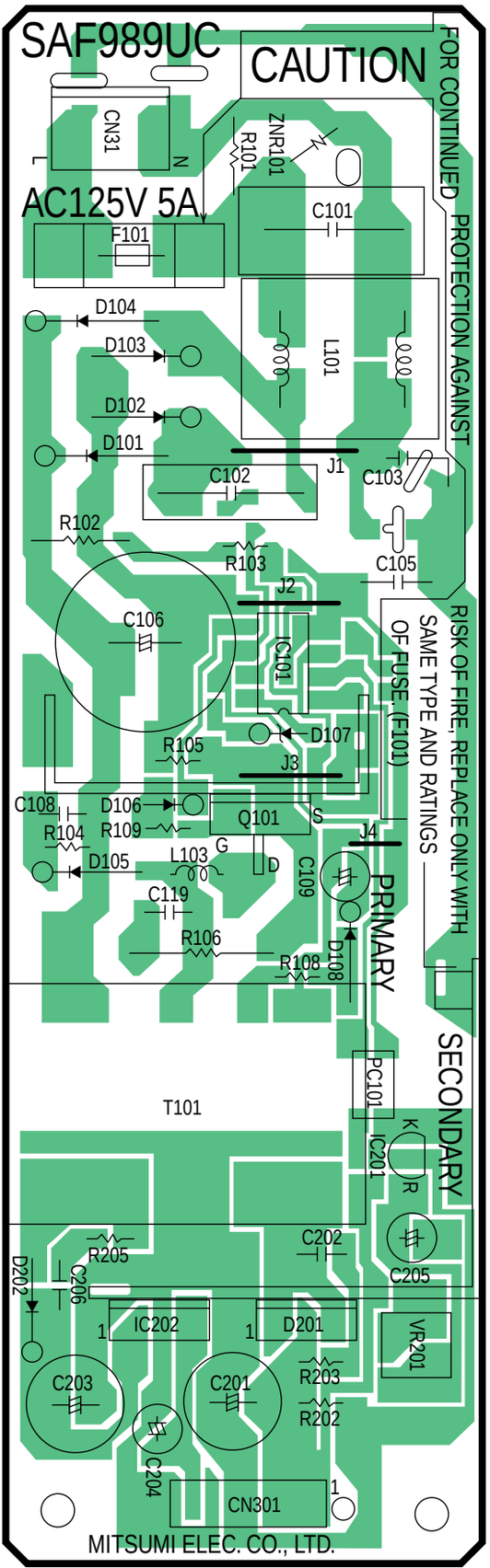
(COMPONENT VIEW)



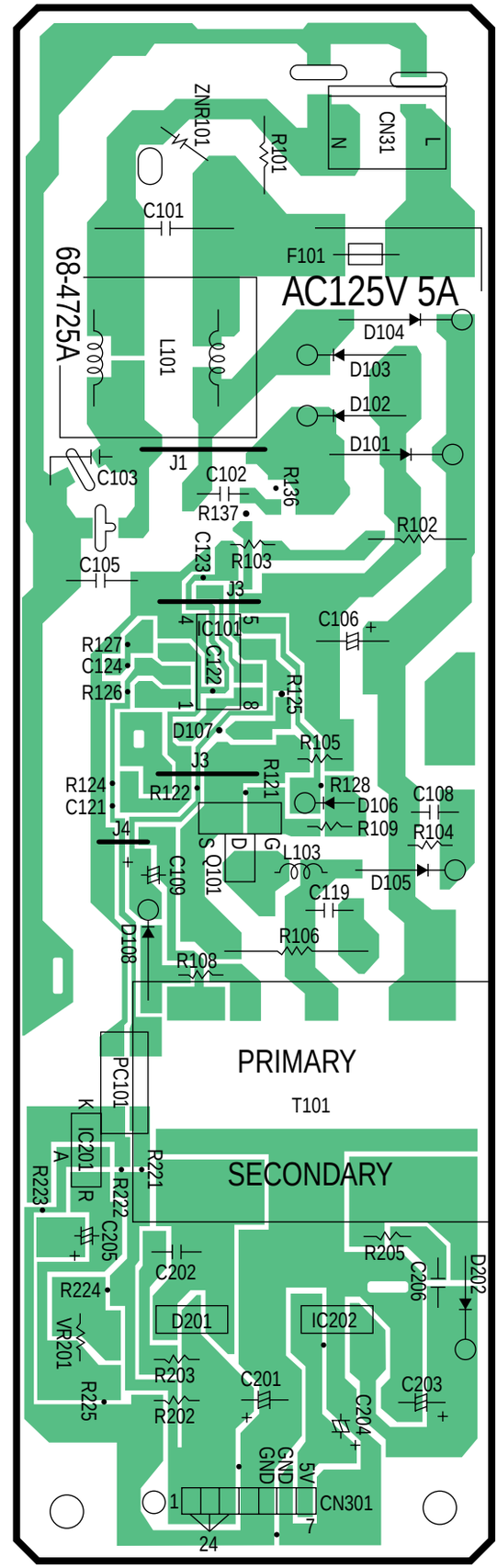
(BOTTOM VIEW)



(COMPONENT VIEW)



(BOTTOM VIEW)



FAX TX Signal
FAX RX Signal

TO POWER UNIT
CN506
+5V
DG
PG
PG
+24V
+24V
+24V

TO THERMAL HEAD
CN505
COM(THON)
THLATCH
STB1
GND(PG)
+5V
TM
THCLK
GND
STB2
THDAT
COM(THON)

TO MOTOR
CN502
M3
M2
M1
M0
COM

TO OPERATION PANEL
CN504
RESET
KSCLK
KTXD
KRXD
KLATCH
KSTART
JOG1
JOG2
+5V
GND
MICIN

TO ANALOG BOARD
CN501
+24V
AG
+5VA
LINERX
LINETX
HSTX
HSRX
SPOUT
SPMUTE
ON-MREN
LINERLY
BELL
EXTHOOK
HOOK
MPOS

SENLEDON
PTOP
FILMEND
THDAT
THCLK
THLAT
STB1
THON
THCLK
STB2
THDAT
THDAT
THCLK
THLAT
STB1
STB2
STB3
MTE
MT0
MT1
MT2
MT3
TX0
TX1
TX2
TX3
TXE
KSTART
KLATCH
KSCLK
KTXD
KRXD
KRXD/KTXD
KSCLK
KLATCH
KSTART
XWDERR
THDAT
THCLK
THON
THLAT
JOG1
JOG2
RESET
OPRESET
TEST
XTEST
24MHz
32.768KHz
MDMTXEN
MDMRXEN
HSRXEN
OF-MREN
HSTXMUTE
TONEZEN
CISLED
CISSEL
CISON
FTG
F1
SIG
SI
CLK
MPOS
EXTHOOK
BELL
LINERLY
HOOK
SPMUTE
ON-MREN
LINERLY
BELL
EXTHOOK
HOOK
MPOS

IC504
IC502
IC503
IC506
IC508
IC509
IC510
IC511
IC505

NC...Not Used

FAX TX Signal
FAX RX Signal

HANDSET, MONITOR
FAX RX
2.0V

HANDSET
FAX TX
12V

EX-TEL OFF-HOOK
5V
0V

TO TEL LINE
CN102

TO EXT.TEL
CN103

TO DIGITAL BOARD
CN101
+24V 15
AG 14
+5VA 13
LINERX 12
LINETX 11
HSTX 10
HSRX 9
SPOUT 8
SPMUTE 7
ON-MREN 6
LINERLY 5
BELL 4
EXTHOOK 3
HOOK 2
MPOS 1

ON-HOOK : 5V
OFF-HOOK: 0V

TO SPEAKER
CN105
SP(+)
SP(-)
2.1V

TO HANDSET
CN104
HSMIC(-)
HSSP(+)
HSSP(-)
HSMIC(+)

NC...Not Used

TO DIGITAL CN301

5V
0V

RESET 11
KSCLK 10
KTXD 9
KRXD 8
KLATCH 7
KSTART 6
JOG1 5
JOG2 4
+5V1 3
GND 2
MICIN 1

R301 470
R376 NC
R302 470
R375 NC

SW351 JOG DIAL
1 JOG1
2 GND
3 JOG2

Z0.1u C304
C360 NC
J330P C305
C361 NC
J330P C308
C362 NC
J330P C309
C363 NC

+5V1

R384 NC
C359 NC
C301 NC
C358 NC
C302 Z0.1u
C303 6.3V 100u

TO DIGITAL CN303
MICIN 1
2
GND 3
NOT USED

IC301

30	RESET	VDD	17
31	SCLK	VDD	40
32	RXD	LED6	2
33	TXD	LED1	22
34	LATCH	RS	23
35	START	R/W	24
42	KIN0	E	25
3	KIN1	D4	26
7	KIN2	D5	27
8	KIN3	D6	28
11	KIN4	D7	29
12	KIN5	LED2	36
13	KIN6	LED3	37
14	KIN7	LED4	38
43	KSL0	LED5	41
44	KSL1	XL8	5
1	KSL2	XL9	6
10	KSL3	XL12	15
4	KSL4	XL11	16
9	XL10	XL13	19
18	GND	XL14	20
39	GND	XL15	21

+5V2
+5V1

C365 NC
C311 Z0.1u
C364 NC
C310 Z0.1u

LCD CONTRAST

+5V2
R304 NC
R378 NC
R305 680
R379 NC

5V
0V

R377 NC
R303 27K

0V
LED: ON
5V
LED: OFF

+5V
R318 47
R386 NC
C366 NC
C314 Z0.1u

TO LCD CN302

1	GND
2	+5V
3	V0
4	RS
5	R/W
6	E
7	D0
8	D1
9	D2
10	D3
11	D4
12	D5
13	D6
14	D7

TO COB

R319 47
R320 NC

SW301 NC	MENU SW306	9 SW311	* SW316	RECORD SW321 NC	0 SW326	ERASE SW331 NC	
HELP SW302	MUTE SW307	5 SW312	4 SW317	6 SW322	PLAY MESSAGES SW327 NC	LOCATOR SW332 NC	
VOL+ SW303	COLLATE SW308	2 SW313	1 SW318	RESOLUTION SW323	CALLER ID SW328 NC	3 SW333	
VOL- SW304	QUICK SCAN SW309	COPY/START/SET SW314	REDIAL/PAUSE SW319	MONITOR SW324	FLASH SW329	STOP SW334	
AUTO ANSWER SW305	IQ-FAX SW310	8 SW315	7 SW320	INTERCOM SW325 NC	DIRECTORY PROGRAM SW330	# SW335	

+5V2

R310 NC
IN USE1 LED301
R311 NC
IN USE2 LED302
NEW MESSAGES
R312 NC
LED303

5V
0V

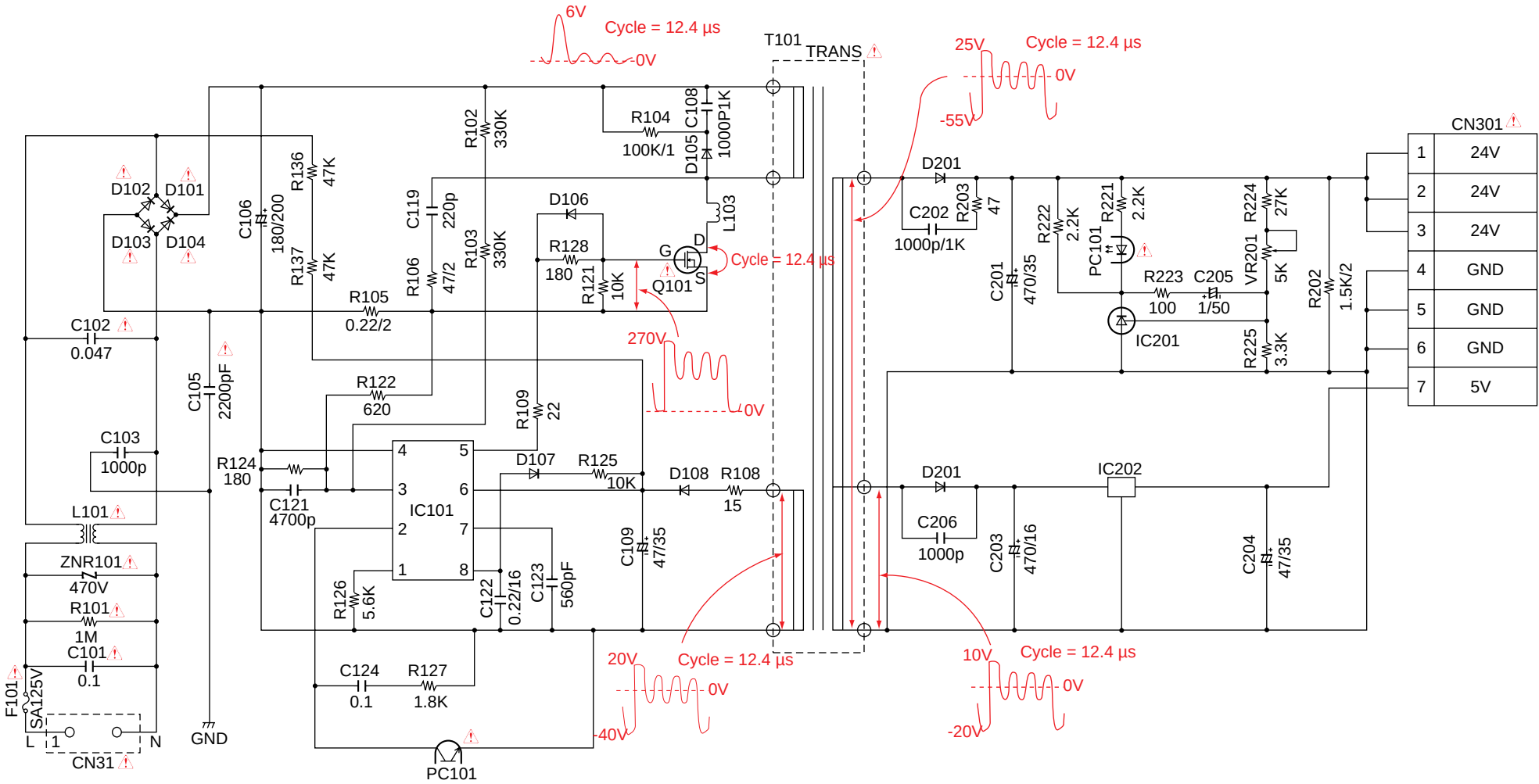
+5V2
R316 4.7K
R381 NC
R380 NC
R317 100
SW353
C367 NC
C317 K0.01
DOCUMENT TOP SW

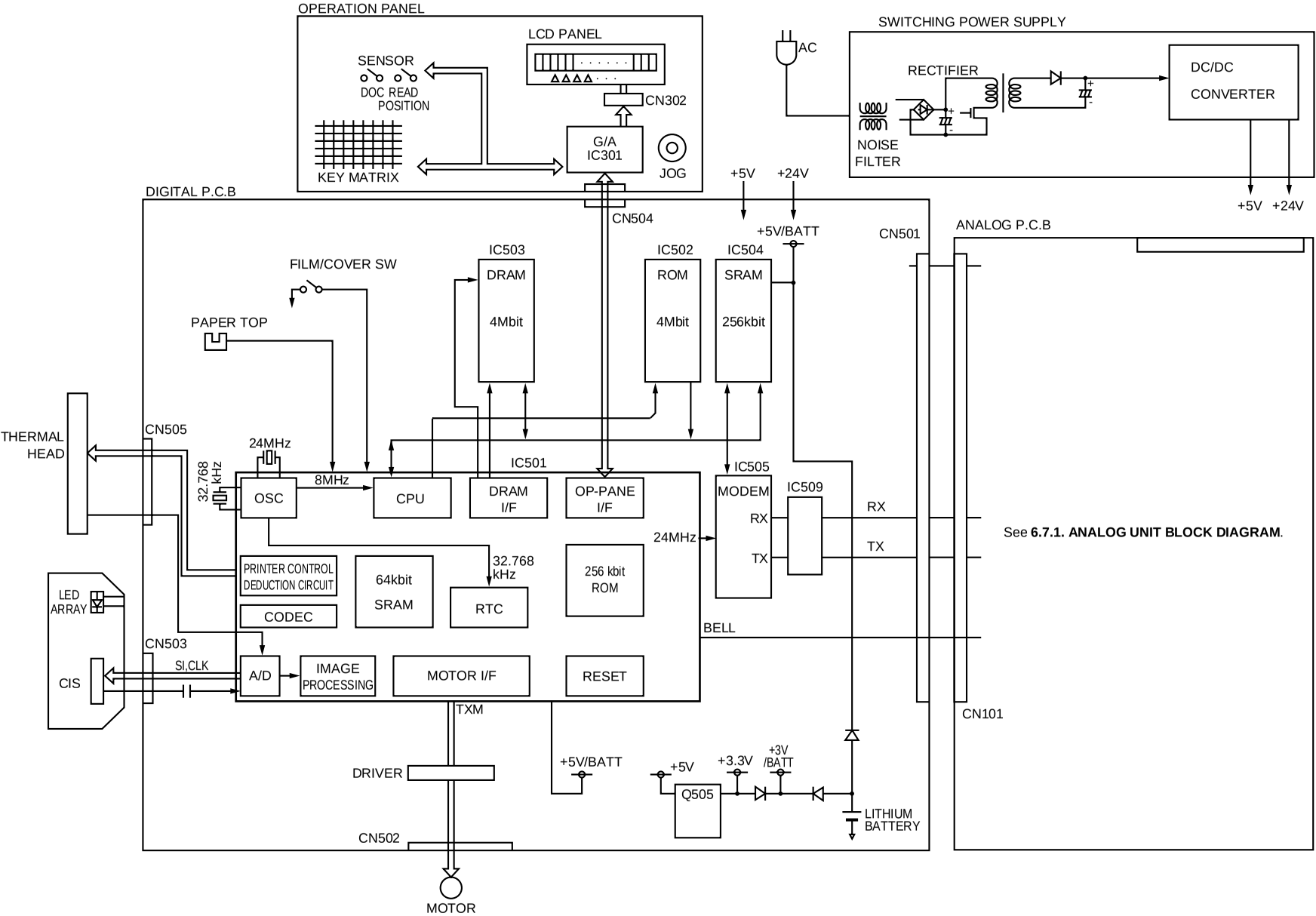
+5V2
R314 4.7K
R383 NC
R382 NC
R315 100
SW352
C368 NC
C316 K0.01
DOCUMENT SET SW

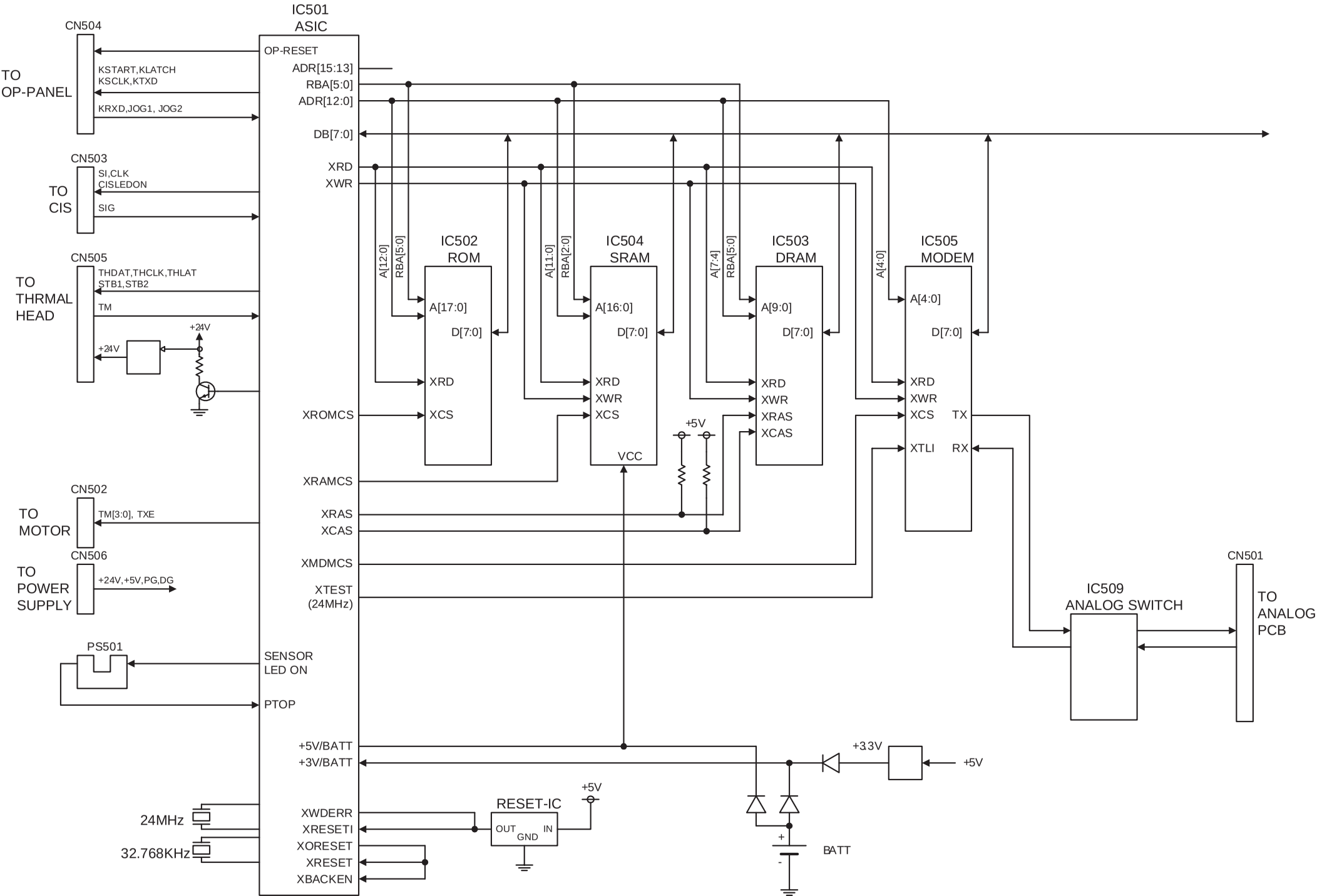
NOT USED

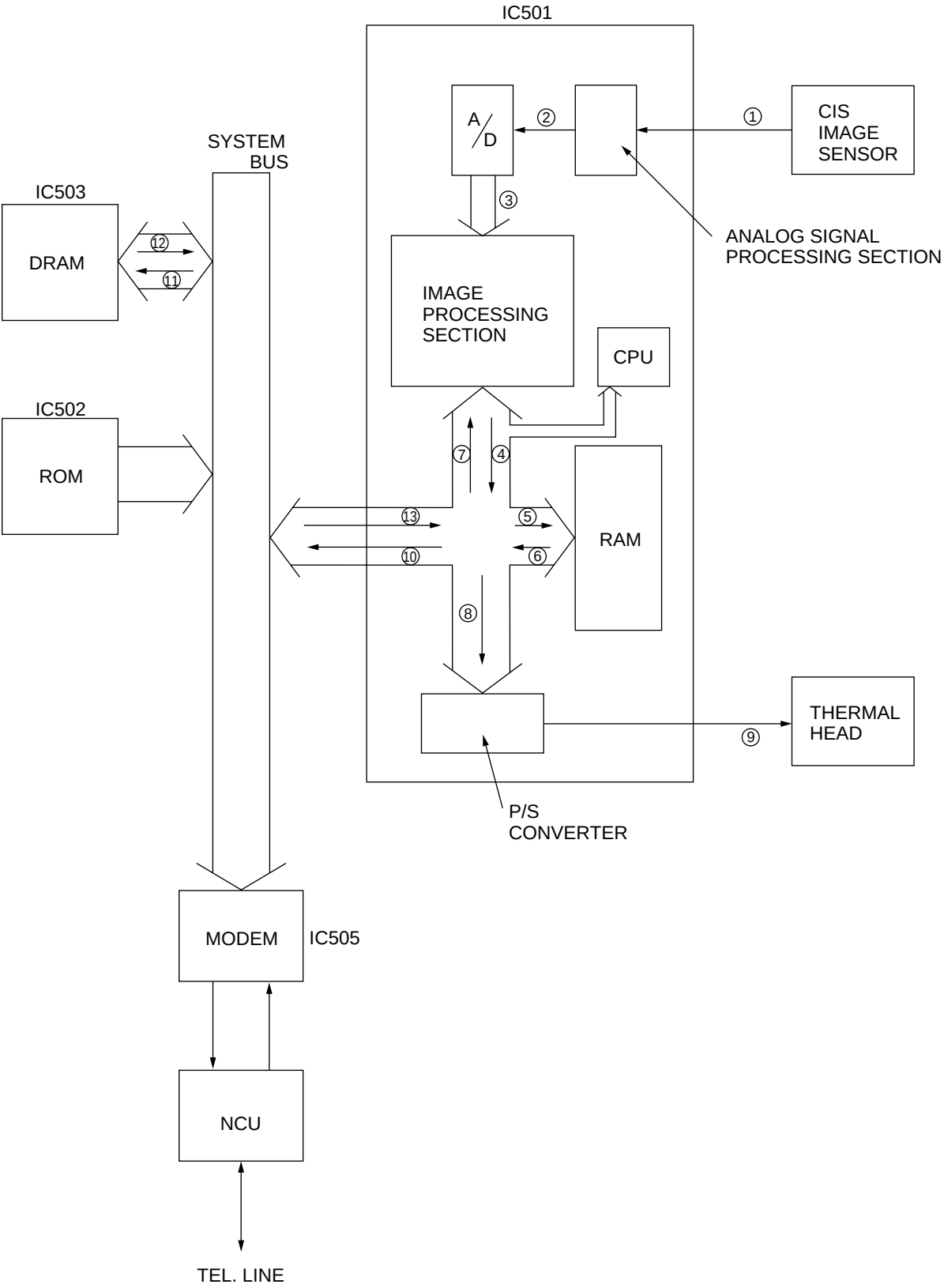
+5V2
R385
IC302
C369
C357
C355
R356
C356
R355
C353
+5V2
R351
R352
C352
TO MIC
MIC (+)
MIC (-)
C351 NC
+5V2
R353
R357
C354
R354

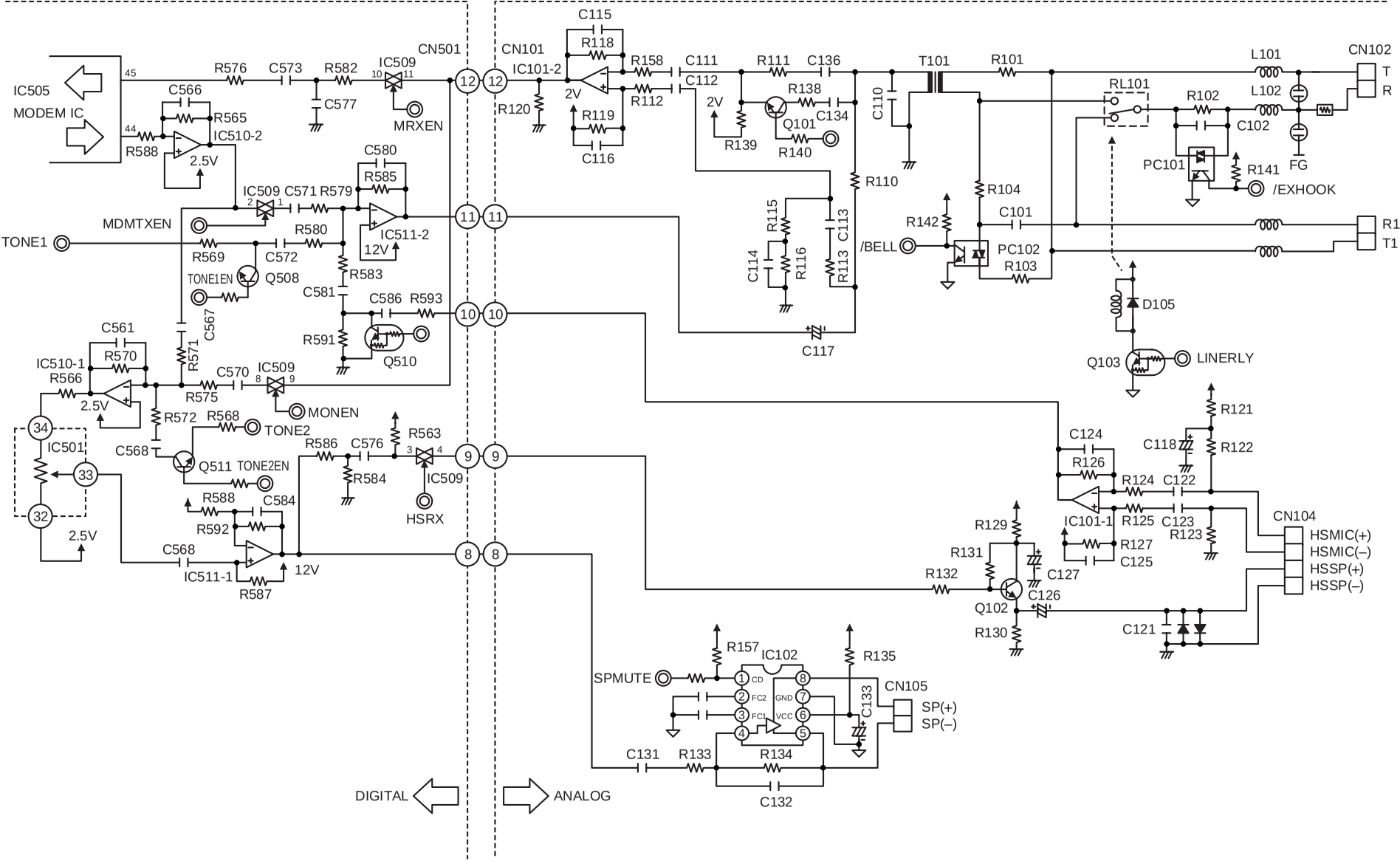
NC....Not Used

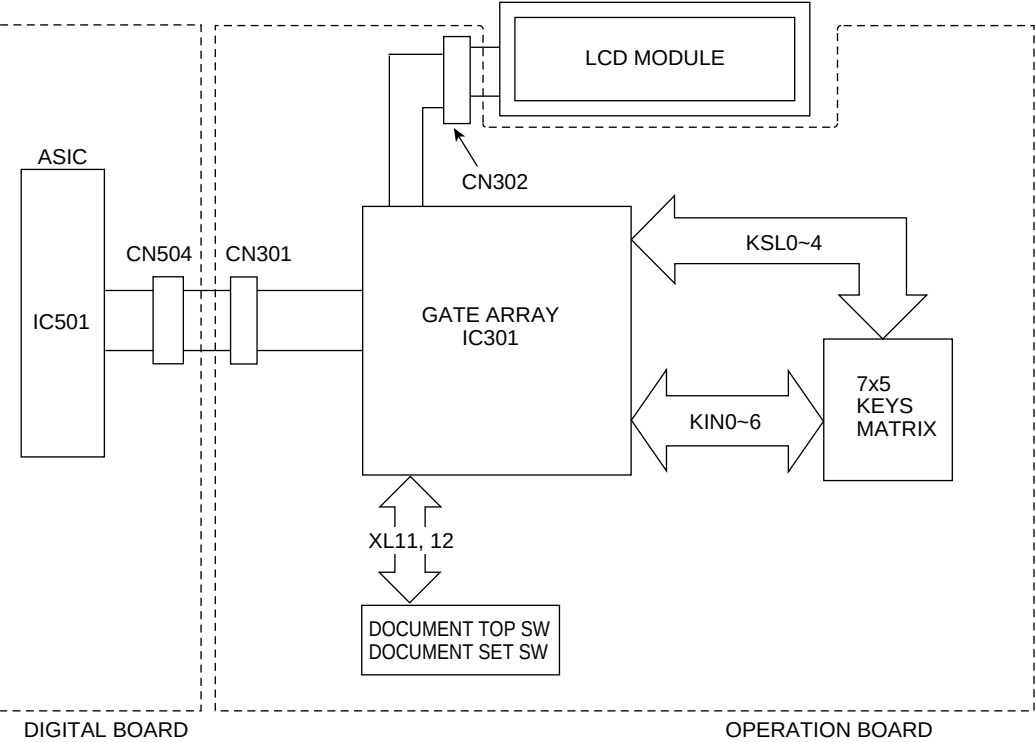

6V
Cycle = 12.4 µs
0V
T101
TRANS
25V
Cycle = 12.4 µs
0V
-55V
CN301
1 24V
2 24V
3 24V
4 GND
5 GND
6 GND
7 5V
D102
D101
D103
D104
C106
180/200
R136
47K
R137
47K
R102
330K
R104
100K/1
C108
D105
1000P1K
C119
220p
R106
47/2
R103
330K
D106
R128
180
R121
10K
G
D
S
Q101
L103
Cycle = 12.4 µs
R105
0.22/2
270V
0V
C102
0.047
C105
2200pF
R122
620
R109
22
C103
1000p
R124
180
C121
4700p
L101
ZNR101
470V
R101
1M
C101
0.1
F101
SA125V
L
1
N
CN31
GND
IC101
4
5
3
6
2
7
1
8
D107
R125
10K
D108
R108
15
C109
47/35
R126
5.6K
C122
0.22/16
C123
560pF
C124
0.1
R127
1.8K
PC101
20V
Cycle = 12.4 µs
0V
-40V
D201
C202
1000p/1K
R203
47
C201
470/35
R222
2.2K
PC101
R221
2.2K
R224
27K
R223
100
C205
1/50
VR201
5K
IC201
R225
3.3K
R202
1.5K/2
D201
IC202
C206
1000p
C203
470/16
C204
47/35
10V
Cycle = 12.4 µs
0V
-20V


OPERATION PANEL
LCD PANEL
SENSOR
DOC READ POSITION
CN302
KEY MATRIX
G/A IC301
JOG
SWITCHING POWER SUPPLY
AC
RECTIFIER
DC/DC CONVERTER
NOISE FILTER
+5V
+24V
DIGITAL P.C.B
CN504
+5V/BATT
CN501
ANALOG P.C.B
IC503
DRAM 4Mbit
IC502
ROM 4Mbit
IC504
SRAM 256kbit
FILM/COVER SW
PAPER TOP
THERMAL HEAD
CN505
24MHz
32.768 kHz
IC501
OSC
8MHz
CPU
DRAM I/F
OP-PANE I/F
IC505
MODEM
IC509
RX
TX
See 6.7.1. ANALOG UNIT BLOCK DIAGRAM.
PRINTER CONTROL DEDUCTION CIRCUIT
64kbit SRAM
32.768 kHz
RTC
256 kbit ROM
CODEC
LED ARRAY
CIS
CN503
SI,CLK
A/D
IMAGE PROCESSING
MOTOR I/F
RESET
BELL
CN101
TXM
DRIVER
+5V/BATT
+5V
+3.3V
+3V /BATT
Q505
LITHIUM BATTERY
CN502
MOTOR

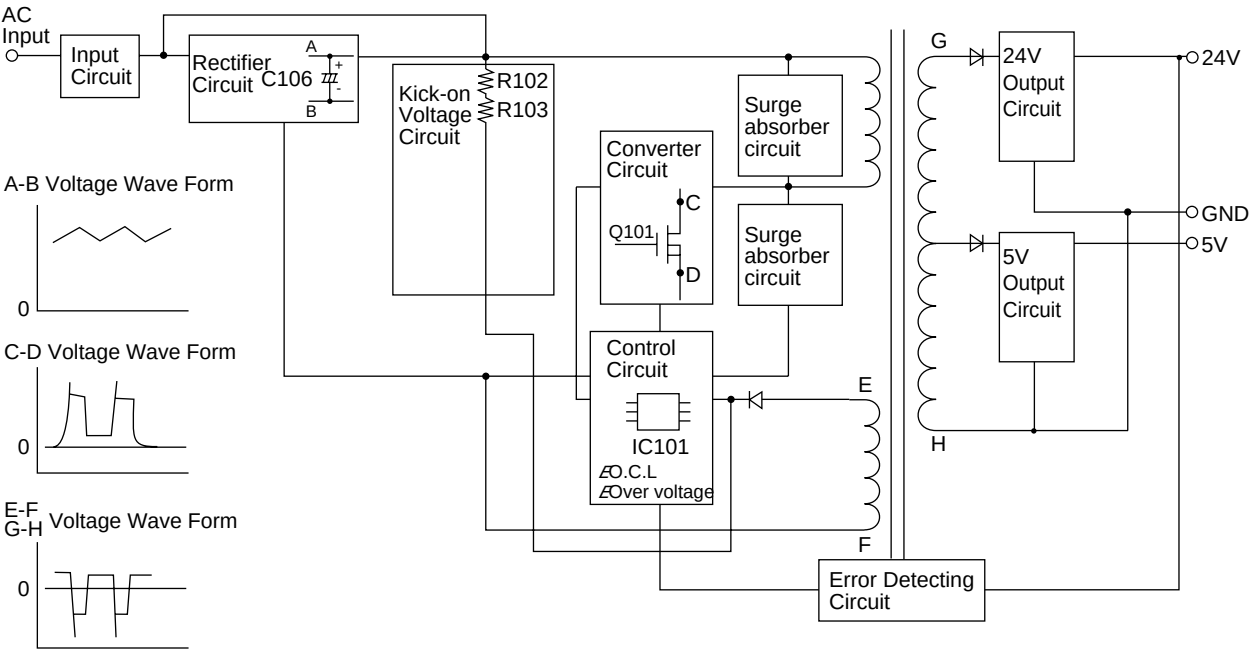

IC501
ASIC
CN504
TO
OP-PANEL
KSTART,KLATCH
KSCLK,KTXD
KRXD,JOG1, JOG2
CN503
TO
CIS
SI,CLK
CISLEDON
SIG
CN505
TO
THRMAL
HEAD
THDAT,THCLK,THLAT
STB1,STB2
TM
+24V
+24V
CN502
TO
MOTOR
TM[3:0], TXE
CN506
TO
POWER
SUPPLY
+24V,+5V,PG,DG
PS501
SENSOR
LED ON
PTOP
24MHz
32.768KHz
OP-RESET
ADR[15:13]
RBA[5:0]
ADR[12:0]
DB[7:0]
XRD
XWR
XROMCS
XRAMCS
XRAS
XCAS
XMDMCS
XTEST
(24MHz)
+5V/BATT
+3V/BATT
XWDERR
XRESETI
XORESET
XRESET
XBACKEN
IC502
ROM
A[12:0]
RBA[5:0]
A[17:0]
D[7:0]
XRD
XCS
IC504
SRAM
A[11:0]
RBA[2:0]
A[16:0]
D[7:0]
XRD
XWR
XCS
VCC
IC503
DRAM
A[7:4]
RBA[5:0]
A[9:0]
D[7:0]
XRD
XWR
XRAS
XCAS
IC505
MODEM
A[4:0]
A[4:0]
D[7:0]
XRD
XWR
XCS
TX
XTLI
RX
+5V
RESET-IC
OUT
GND
IN
+5V
+3.3V
+5V
+
-
BATT
IC509
ANALOG SWITCH
CN501
TO
ANALOG
PCB


IC501
A/D
②
①
CIS
IMAGE
SENSOR
SYSTEM
BUS
IC503
③
DRAM
⑫
⑪
ANALOG SIGNAL
PROCESSING SECTION
IMAGE
PROCESSING
SECTION
CPU
IC502
ROM
⑦
④
⑬
⑤
RAM
⑩
⑥
⑧
THERMAL
HEAD
⑨
P/S
CONVERTER
MODEM
IC505
NCU
TEL. LINE

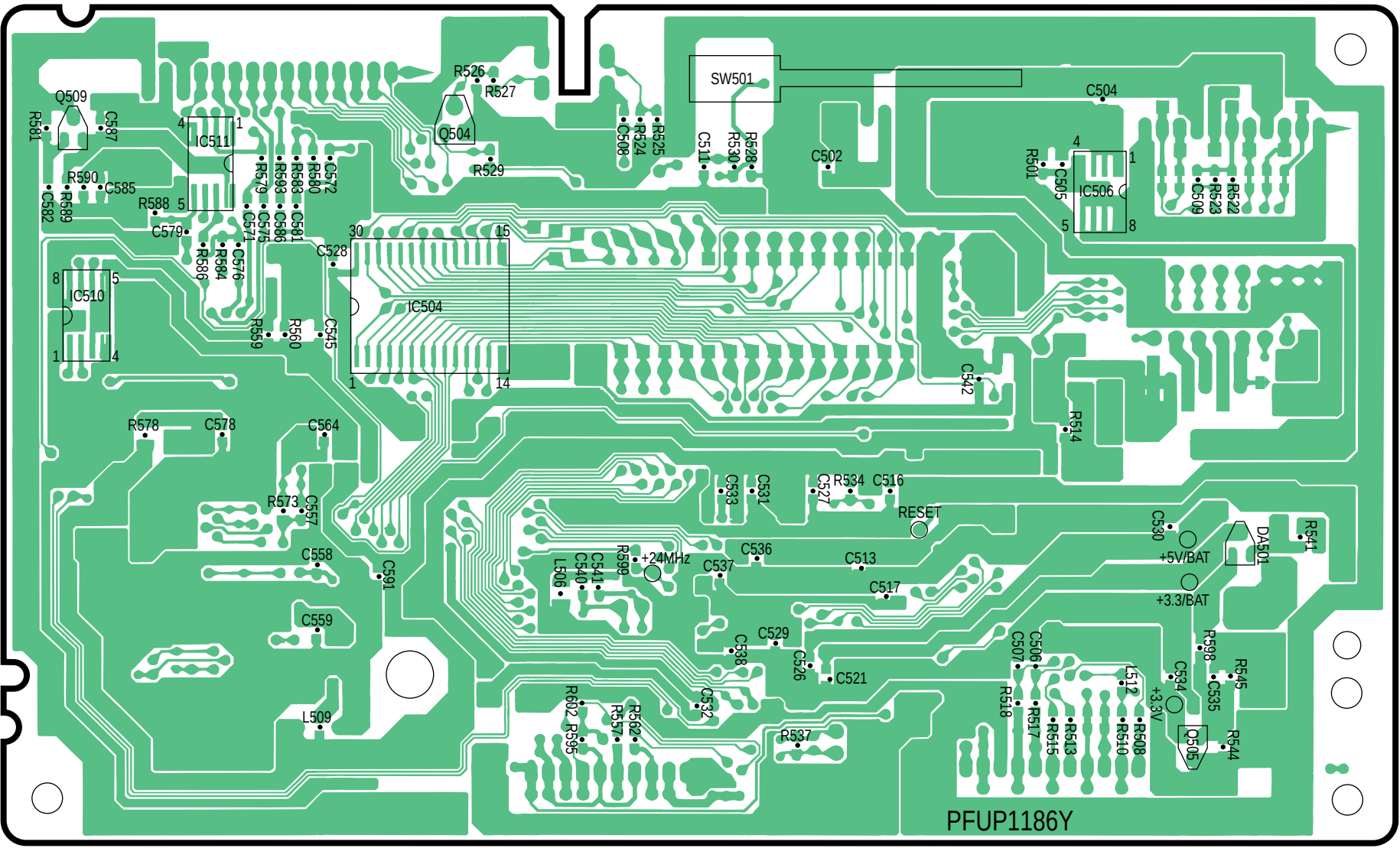

IC505
MODEM IC
CN501
CN101
IC101-2
2V
C115
R118
C116
R119
R120
R158
C111
C112
R112
R111
C136
R138
C134
Q101
R140
R139
2V
C110
T101
R101
L101
L102
CN102
T
R
RL101
R102
C102
PC101
R141
/EXHOOK
FG
R104
C101
R142
/BELL
PC102
R103
R110
R115
C114
R116
C113
R113
C117
D105
Q103
LINERLY
R121
R122
C118
C124
R126
R124
C122
R125
C123
R123
IC101-1
R127
C125
CN104
HSMIC(+)
HSMIC(–)
HSSP(+)
HSSP(–)
R129
R131
R132
C127
C126
Q102
R130
C121
R157
IC102
R135
SPMUTE
CD
FC2
FC1
GND
VCC
CN105
SP(+)
SP(–)
C133
C131
R133
R134
C132
C566
R565
IC510-2
2.5V
R588
R576
C573
R582
C577
IC509
MRXEN
C580
R585
IC509
C571
R579
IC511-2
12V
MDMTXEN
TONE1
R569
C572
R580
R583
TONE1EN
Q508
C581
C586
R593
R591
Q510
C567
C561
R570
R571
IC510-1
R566
2.5V
C570
IC509
R575
MONEN
R572
R568
TONE2
C568
Q511
TONE2EN
R586
C576
R563
R584
IC509
HSRX
R588
C584
R592
C568
IC511-1
R587
12V
IC501
2.5V
DIGITAL
ANALOG


LCD MODULE
CN302
ASIC
IC501
CN504
CN301
GATE ARRAY
IC301
KSL0~4
KIN0~6
7x5
KEYS
MATRIX
XL11, 12
DOCUMENT TOP SW
DOCUMENT SET SW
DIGITAL BOARD
OPERATION BOARD

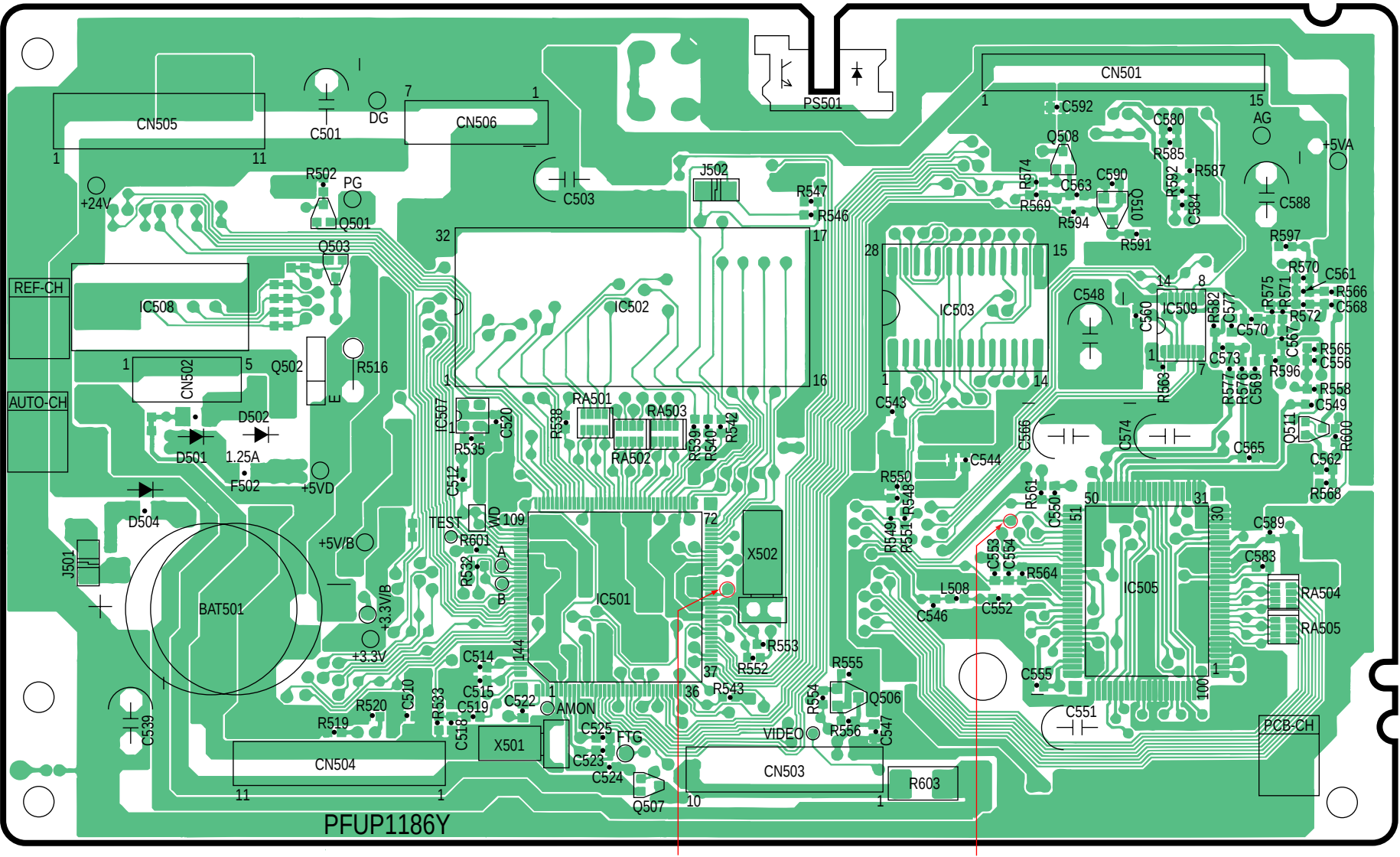
Block Diagram



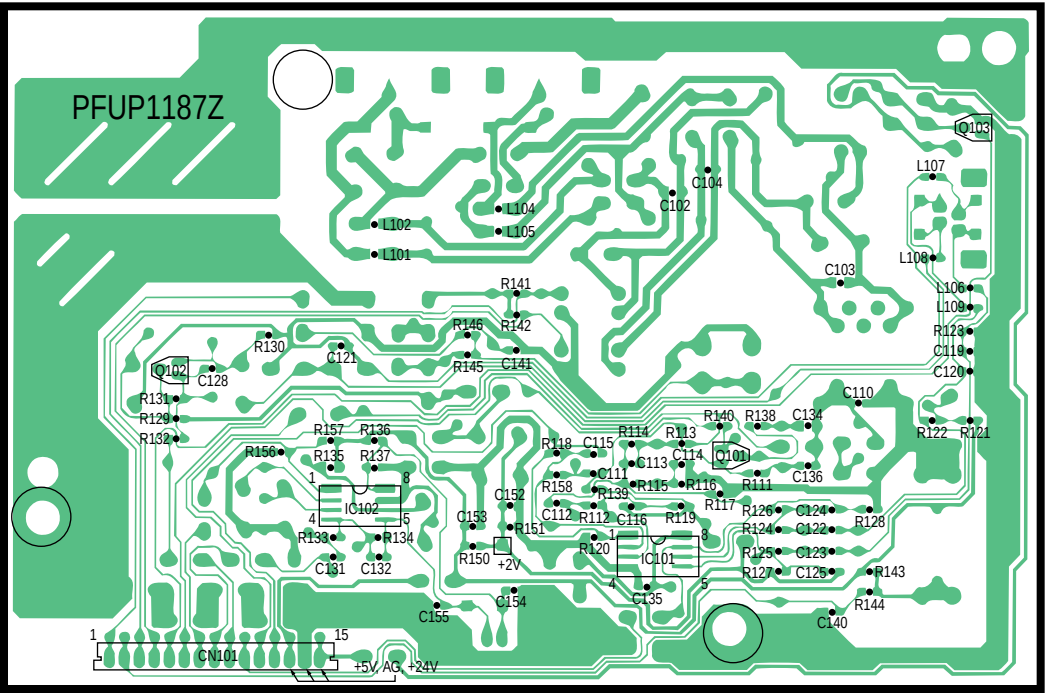
(BOTTOM VIEW)


Q509
R581
C587
IC511
R590
C585
R589
C582
R588
C579
R586
C576
R584
C571
R579
C575
R593
C586
R583
C581
R580
C572
IC510
R559
R560
C545
C528
IC504
R578
C578
C564
R573
C557
C558
C591
C559
L509
R526
R527
Q504
R529
SW501
C508
R524
R525
C511
R530
R528
C502
C504
R501
C505
IC506
C509
R523
R522
C542
R514
C533
C531
C527
R534
C516
RESET
C530
DA501
R541
+5V/BAT
+3.3/BAT
R599
+24MHz
C536
C537
C513
C517
L506
C541
C540
C529
C538
C526
C521
C532
R602
R595
R562
R557
R537
C507
C506
R598
C534
R545
C535
R518
R517
R515
R513
C512
R510
R508
+3.3V
Q505
R544
PFUP1186Y

(COMPONENT VIEW)



(BOTTOM VIEW)


PFUP1187Z
Q103
L107
C104
C102
L104
L105
L102
L101
L108
C103
L106
L109
R123
C119
C120
R141
R146
R142
R130
C121
R145
C141
Q102
C128
R131
R129
R132
C110
R140
R138
C134
R122
R121
R157
R136
R135
R137
R156
R118
C115
R114
R113
C113
C114
Q101
C136
R111
C111
R158
R139
R115
R116
R117
C112
R112
C116
R119
R126
C124
R124
C122
R128
R125
C123
R127
C125
R143
R144
C140
C152
C153
R151
R150
+2V
R120
IC101
C135
C154
C155
IC102
R133
R134
C131
C132
CN101
+5V
AG
+24V